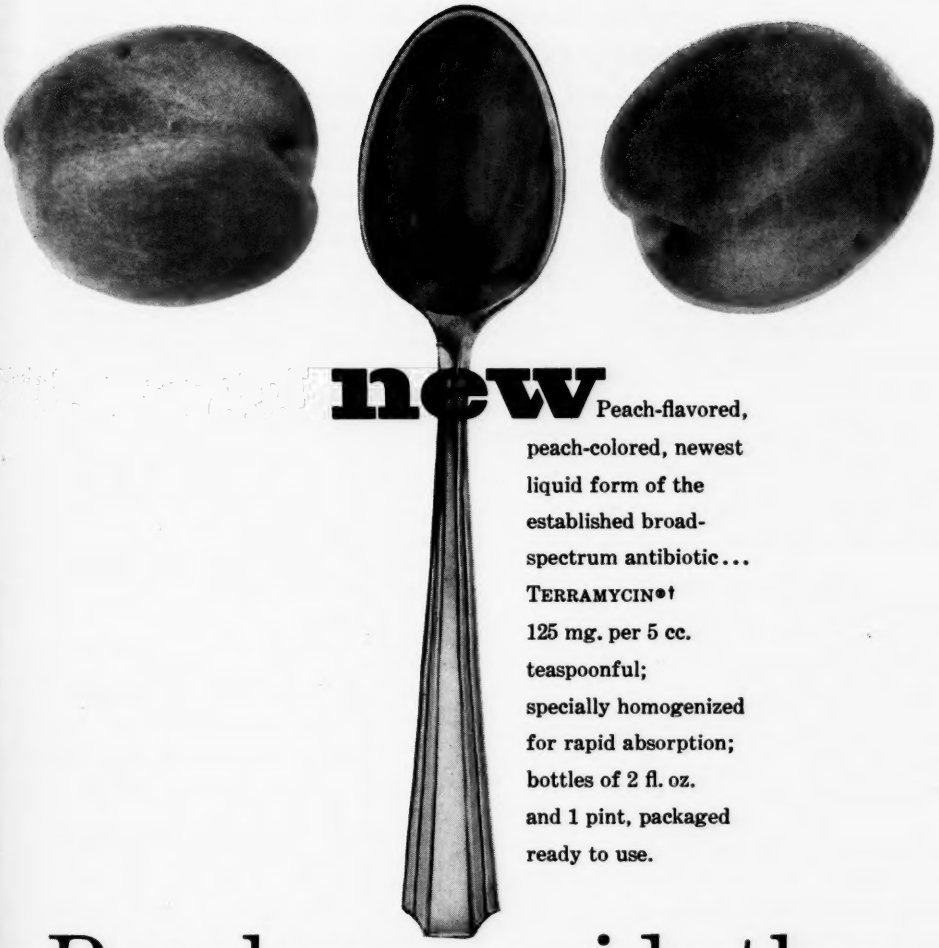
# RHODE ISLAND MEDICAL JOURNAL



JULY, 1956



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# The RHODE ISLAND MEDICAL JOURNAL

*Editorial and Business Office: 106 Francis Street, Providence, R. I.*

*Editor-in-Chief:* JOHN E. DONLEY, M.D.

*Managing Editor:* JOHN E. FARRELL

*Owned and Published Monthly by*

THE RHODE ISLAND MEDICAL SOCIETY

Entered as second-class matter at the post office at Providence, Rhode Island

Single copies, 25 cents . . . Subscription, $2.00 per year.

Volume XXXIX, No. 7 July 1956

## TABLE OF CONTENTS

The RHODE ISLAND MEDICAL JOURNAL

VOL. XXXIX JULY, 1956 NO. 7

The 73d Caleb Fiske Prize Essay

# THE RADIOIRON TURNOVER TEST IN CLINICAL MEDICINE*

R. KENNETH LOEFFLER, M.D.

The Author. *R. Kenneth Loeffler, M.D., of Houston, Texas. American Cancer Society Fellow, Columbia University, 1951-52; Assistant Professor of Radiology, Baylor University, 1952-54; Associate Professor of Radiology, Baylor University, 1954-56; Associate Professor of Radiology (Therapy), Temple University School of Medicine, Philadelphia, Pa., 1956.*

RADIOACTIVE IRON has been used for about fifteen years to investigate iron metabolism.[1-5] The intravenous iron turnover test as a specific diagnostic aid for the study of hemoglobin production was described by Huff et al in 1950.[6] That group and others have studied many clinical and experimental phases of iron metabolism with this standardized technique, and utilizing other equipment and techniques.[7-32] A slight modification[33] has made it possible to perform the test more simply on a routine laboratory basis. Using the technique as described below, over 700 tests on more than 300 patients have been performed in this department, permitting some generalizations to be drawn.

The radioiron turnover test in its simplest form provides a method for determining the daily production of hemoglobin, and for estimating the functional status of the erythropoietic system. It is a useful aid in the differential diagnosis of anemia, and also provides a quantitative statement of the severity of the disorder. For example, a hemoglobin level of 8 grams per 100 ml. blood tells only that the over-all balance between hemoglobin production and destruction is such that the body can maintain approximately half of the normal hemoglobin concentration. Radioiron studies will indicate whether this balance results from half of the normal production, with a normal life span; or normal production with half the normal span; or perhaps twice the normal production as a response to the anemia, with a life span of the circulating erythrocytes of only one-fourth of normal.

The first part of this test, the determination of the rate at which plasma-bound iron is cleared from the circulation, can be performed in a matter of two to three hours. While this part of the test is rarely sufficient in itself to complete the quantitative diagnosis, it can serve as a very rapid index of *change* of hemoglobin production. When hemoglobin production is depressed by large doses of total body radiation or cancer chemotherapeutic agents, the change can be readily documented by successive iron turnovers within twenty-four hours. Detailed analysis of the uses and advantages of radioiron tracer studies in clinical practice will be given below in the section on "Interpretation."

## Part I
## IRON METABOLISM

### The Basis for the Use of the Tracer

The radioiron turnover test and its modifications can be logically derived and interpreted from a consideration of normal iron metabolism.[34-36] This is shown schematically in Figure 1.

Normal metabolism is a "closed system," i.e., the body tends to maintain its iron supply with a minimum of excretion, and absorbs just enough to compensate for the small losses. A normal 70 Kg. man has about 3.5-4.5 grams of iron, about 2.5 grams as hemoglobin iron, .002-.003 grams as circulating plasma iron, and the remainder as storage iron or in a relatively fixed status in myoglobin and the cytochrome respiratory enzymes. The hemoglobin cycle (synthesis of new hemoglobin and breakdown of old red cells) is responsible for the major turnover of iron. Since 2.5 grams of iron are present at all times in red cells, and since these cells live approximately 120 days, then about 0.83%, or about 21 mg., of this iron must be released from destroyed cells and a comparable amount reutilized in new hemoglobin formation each day. Iron is transported from the site of destruction to the erythropoietic tissue by the plasma. With the

*continued on next page*

*Delivered at the 145th Annual Meeting of the Rhode Island Medical Society, at Providence, Rhode Island, May 2, 1956.

plasma containing 2-3 mg. of iron at any given time, yet transporting at least 21 mg. per day, there must be a replacement at least 7-10 times per day. In spite of its small iron content, the plasma transport system is of crucial importance. It is also readily available for sampling and serial analysis. The iron turnover test is designed to measure the rate of the plasma iron replacement, and the rate and extent of the utilization of this iron for hemoglobin formation.

Between 90 and 100% of the total iron in the plasma occurs as transport iron. This portion is bound reversibly to a beta globulin, the IV-7 fraction of Cohn's classification, also named transferrin. A portion of this protein-bound iron is removed by the bone marrow and storage depots with each circulation of the blood. Meanwhile, the plasma iron concentration is maintained by iron from the breakdown of old red cells, to a lesser extent from the storage depots, and by a still smaller amount from intestinal absorption. This concentration is not constant, being subject to diurnal variations as well as reflecting disease states.[37-39]

The iron removed from the plasma by erythropoietic tissue is rapidly incorporated into hemoglobin and released back to the circulation in the red blood cells. Usually 80-95% of the iron cleared from the plasma is so utilized, the other 5-20% presumably having gone to the storage depots or to fixed systems. (Fig. 1) Some of this radioiron reappears in the circulation in hemoglobin in as short a time as 3-12 hours while maximum reappearance occurs within 5-10 days. There is good evidence that mature red cells cannot exchange hemoglobin iron with plasma iron, although reticulocytes apparently can incorporate some iron directly from the plasma. It is possible that the rapid clearance of plasma iron noted in severe iron deficiency or hemolytic anemia results in part from direct incorporation into reticulocytes.

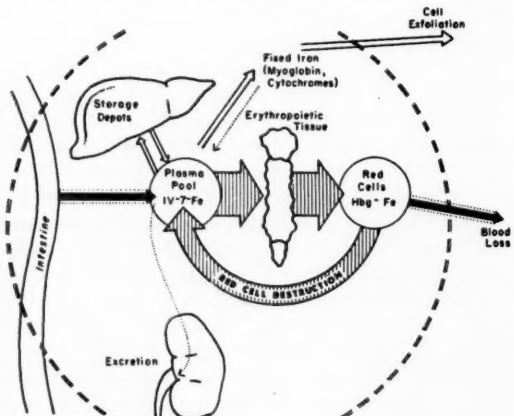


FIGURE 1
NORMAL IRON METABOLISM

A variable amount of iron exists in the reticuloendothelial storage depots, primarily of the liver, spleen, and bone marrow. In a normal state, the storage depots function effectively to maintain the concentration of transport iron, accepting iron when the plasma concentration is high and yielding iron when the plasma concentration falls. The turnover of the plasma iron is therefore due in part to this equilibrium with storage iron, although normally this is of much less magnitude than that due to the hemoglobin cycle.

A small amount of iron occurs in apparently fixed forms in myoglobin, the cytochrome enzymes, and to a lesser extent in other cellular components. Present evidence indicates that this iron is probably not in equilibrium with the remainder of the body iron, but is released only with cell destruction or exfoliation. Loss of body iron normally occurs largely by this method, urinary, fecal, and sweat losses being small though measurable and of physiologic importance.[21, 40-43] Women have a regular loss of hemoglobin iron during menses.

The rate of replacement of iron is controlled in the intestinal mucosa by an iron-binding enzyme, *apo-ferritin*. Since there is no physiological mechanism for excreting excess iron, the body content must be limited by absorbing only enough from ingested food to replace actual loss. Apo-ferritin usually has attached a saturating quantity of iron, this apo-ferritin iron complex being called *ferritin*. When the body stores of iron are decreased, ferritin releases some of its iron to the plasma, and can then absorb an equal quantity from the intestinal contents. There is uncertainty whether the release of iron by ferritin to the plasma is controlled directly by the plasma iron concentration, or indirectly by the status of the storage depots.[44] Hemochromatosis is apparently a disease associated with uninhibited absorption of iron.[20, 27, 32, 45-47]

### *Procedure*

A purpose of the iron turnover test is to determine the amount of hemoglobin formed per day. To do so, it is necessary to know: (a) the plasma iron concentration, (b) the rate at which this iron leaves the plasma, (c) the percentage of this iron which is incorporated into hemoglobin, and (d) the blood volume. The iron concentration is determined by chemical procedures.[48, 49] The remaining three items are determined using radioactive tracer techniques.

If a functionally negligible quantity of a substance is distributed uniformly throughout a metabolic pool of the same substance, it will react exactly as does the native material, and will not alter the normal reactions. If the added material is

radioactive, its subsequent distribution may be determined by appropriate detection techniques. Meticulous attention must be paid to consideration that a true tracer study is being performed: (a) that the tracer is truly identical to the substance being traced; (b) that the tracer is not in such large quantity as to measurably increase the material present, which may alter its subsequent distribution; (c) that the sampling procedure does not change the system to any measurable extent; and (d) that the radiation does not affect the system.

The perfect tracer for iron turnover studies is radioiron attached to the IV-7 plasma fraction. This iron protein complex can be injected intravenously to become distributed uniformly in the existing plasma iron. Samples of plasma can then be taken at intervals to determine the disappearance rate, and later whole blood samples to evaluate reappearance. Initially the tracer was prepared by incubating the patient's plasma with buffered iron salts at room temperature for at least ten minutes, allowing the iron to become attached to transferrin, before reinjection.[6] It has been shown[33] that iron transfers from iron citrate at pH 7 to the iron binding protein sufficiently rapidly as to permit the direct injection of radioiron citrate. Latent iron binding capacity sufficient to accept the minute quantity of iron injected is present even in conditions associated with near saturation of the IV-7 fraction.[50-51] This technique has the advantage that the tracer may be prepared in bulk and stored in withdrawal bottles for several weeks. The possibilities of bacterial contamination and of denaturation of protein during the preparation procedures are also reduced. Iron citrate can be prepared[33] from iron chloride as received from the Atomic Energy Commission, containing about one microgram of iron per microcurie of radioactivity. A tracer dose of four microcuries will contain a quantity of iron small (4-8 micrograms) in comparison to normal plasma iron levels (about 100 micrograms per 100 ml. of plasma). The radiation received by the body in the course of an iron turnover is a small fraction of that received during a routine chest roentgenogram. The taking of five or ten blood samples of two-three ml. each is not likely to reduce the blood volume enough to measurably affect hemoglobin production. Thus the criteria for a tracer study are well met.

The radioactive tracer, consisting of protein-bound radioiron or radioiron citrate, is introduced into the general circulation, where it usually equilibrates within 5-10 minutes. With each circulation of the blood, a portion of the radioactive as well as of the normal iron will be removed. While non-radioactive iron enters the circulation to maintain the plasma concentration, the radioactive material is constantly being depleted, a similar percentage of the *residual* being removed with each circulation. Since a portion only of the residual is removed, all radioactive molecules can, in theory at least, never be removed. This is similar to cutting a string in half, then cutting one of the pieces in half again, etc. In theory there will always be a piece left to cut in half, although in practice this will soon become microscopically small. Since it is impossible to state a time when all the iron has disappeared, two conventional expressions of rate are used. One is to state the percentage removed in a convenient time period, e.g., 40% per hour. The other is to give the time required to reach a given per cent of the *initial* activity, e.g., one-half. This later method, expressed as half-time, is most frequently used in medical literature and will be used here.

After the injection of radioiron, samples of plasma are obtained at intervals, and their radioactivity determined. The simplest way to obtain the clearance half-time is to plot the activity of the plasma samples against time on semi-logarithmic graph paper (Figure II). If the activity is decreasing exactly by halves, a straight line will be obtained, from which the half-time is determinable.

The disappearance curve may not be a perfect straight line on semi-logarithmic graph paper, since some radioiron, which initially is removed by the storage depots, will be released back into the plasma. The activity may decrease less rapidly than expected, giving a curved line with a steadily more gentle drop. In our series we have encountered very few disappearance plots which are not almost straight lines, although some workers report quite consistent curvature. If iron citrate solution is kept for many months, it forms a colloid containing iron hydroxide. Such suspensions, and also solutions of iron chloride, will consistently yield curved disappearance plots indicating unreasonably large plasma volumes and impossibly high red cell utilization values. Such data is of course of no value.

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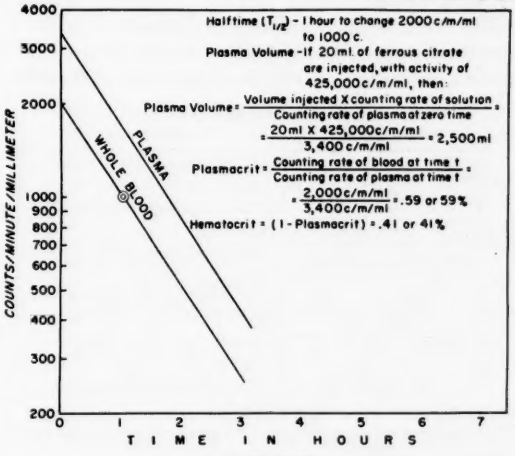


**FIGURE II**

To determine the daily clearance of iron from the entire plasma pool, it is necessary to know the size of the plasma pool. This is obtained incidentally but with considerable reproducibility from the isotopic disappearance rate test. Since a known quantity of radioactivity is added to the plasma, a subsequent determination of the activity of a plasma sample permits a determination of the degree of dilution of the injected material. The fewer the plasma counts, the greater has been the dilution, and therefore the greater the plasma volume. The most reliable value is obtained by drawing the disappearance curve backward to estimate the radioactivity per milliliter of plasma just after injection and using this value to obtain a dilution factor.

It is also necessary to count at least one sample of whole blood taken early during the disappearance test (Figure II). This will permit a calculation of the radioactivity per milliliter of whole blood at zero time, which will be used later to determine the percentage utilization in hemoglobin production. Simultaneously, a comparison of the radioactivity per milliliter of whole blood, and per milliliter of plasma, gives an estimate of the peripheral hematocrit.

To obtain percentage utilization, whole blood samples are taken several days after the disappearance test. By this time all of the radioiron has been removed from the plasma. Some has been incorporated into hemoglobin and released back into the circulation in red blood cells. By dividing the whole blood activity of any sample several days after the disappearance test, by the activity of the zero time whole blood, the percentage incorporation can be computed. It has been shown that the ratio of plasma volume to red cell mass in the whole body is not identical to that of the peripheral venous blood.[52, 53] The ratio of body hematocrit to peripheral hematocrit is quite constant at about 0.91. The red cell mass is thus about 86% of that calculated from the plasma volume and the peripheral hematocrit. As a result, complete utilization of radioiron for hemoglobin production would give a calculated utilization of 116%. The value obtained, even if over 100%, is still the correct figure to use for subsequent calculations, since it indicates that a known plasma pool is contributing iron to a red cell mass smaller than calculated.

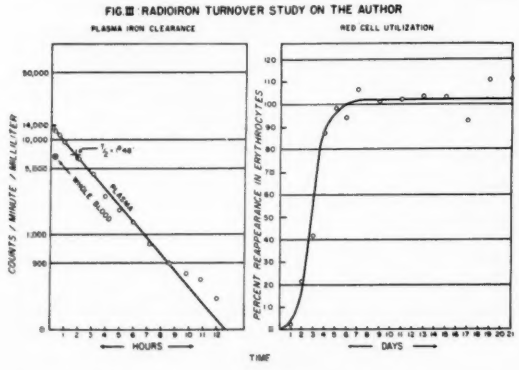

FIG. III RADIOIRON TURNOVER STUDY ON THE AUTHOR

The data obtained experimentally are:

1. Plasma iron concentration—$Fe_{pc}$ (ug. %)
2. Plasma iron disappearance half-time—T/2 (hours)
3. Plasma volume—P.V. (ml.)
4. Hematocrit, either Wintrobe or isotope—Hct. (%)
5. Hemoglobin, routine lab procedure—gm. %
6. Per cent maximum incorporation of radioiron in circulating erythrocytes.

Calculated data are:

1. *Daily Iron Clearance.* Knowing the plasma iron concentration and the rate of removal (and replacement), the amount of iron removed per day from the plasma can be computed with the use of calculus. The formula obtained is:

$$\text{Daily iron clearance per 100 ml. of plasma (in ug.)} = \frac{0.693 \times 24 \text{ hours} \times Fe_{pc} \text{ (in ug. \% plasma)}}{T/2 \text{ (hours)}} = \frac{16.6 \times Fe_{pc}}{T/2}$$

$$\text{Daily clearance per 100 ml. of whole blood (in ug.)} = \frac{(16.6 \times Fe_{pc})}{(T/2)} (1 - \text{Hct})$$

These calculations are subject to errors resulting from diurnal variations in plasma iron concentration and in clearance rate.[38]

2. *Daily Hemoglobin formation.* The iron cleared from the plasma per day, times the per cent incorporated into red cells, gives the quantity of iron utilized per day for hemoglobin formation. Since there are *3.34 mg.* of iron in 1 gram of hemoglobin, the daily hemoglobin production is:

$$\text{Grams Hgb formed per 100 ml. whole blood} = \frac{\text{Daily iron clearance per 100 ml. whole blood (mg/day)} \times \text{per cent utilization}}{3.34}$$

3. *Percentage daily replacement of hemoglobin.* The amount replaced daily divided by the total amount present:

$$\text{\% Replacement/day} = \frac{100 \times \text{grams replaced}}{\text{grams present}}$$

4. *Average life span* is inversely related to the percentage daily replacement:

$$\text{Average life span (days)} = \frac{100}{\text{\% replacement/day}}$$

5. *Total hemoglobin production* for the body can be approximately calculated.

Blood volume (B.V.) is approximately equal to

$$\frac{\text{P.V.}}{\text{Peripheral Plasmacrit}}$$

Grams Hgb. formed/day =
B.V. (in 100 mls) × Grams Hgb. formed per 100 ml. whole blood.

6. A composite formula for calculating red cell life span directly is:

Red cell life span (days) =

$$\frac{\text{Hgb.} \times \text{T}/2 \times 175}{\text{Fe}_{pe} \times \%\text{ uptake} \times (1\text{-Hct})}$$

### *Technique*

1. Withdraw 3-5 cc. of blood into a heparinized syringe for whole blood and plasma samples (1.0-2.0 cc.) for the determination of natural radioactivity.

2. Inject intravenously 5.0-10.0 cc. of $Fe^{59}$ citrate solution containing 4 microcuries of $Fe^{59}$. Avoid venostasis.

3. Obtain heparinized blood samples (3-5 cc.) at 5, 15, 30, 60, and 120 minutes after injection. Avoid venostasis. Pipette 1.0 or 2.0 cc. aliquot of whole blood from the 15 minute sample, and 1.0 or 2.0 cc. of plasma from all samples into counting tubes.

4. Count all samples for steps 1 and 3. Subtract background counts.

5. Plot plasma activity (log scale) against time (linear scale) on semi-log paper.

6. Extrapolate to obtain zero time plasma activity. Determine disappearance half-time ($T\frac{1}{2}$) of plasma $Fe^{59}$.

7. Calculate plasma volume:

$$\text{P.V.} = \frac{\text{Total counts injected}}{\text{Zero time counts/cc. of plasma}}$$

8. Calculate hematocrit from activity of 15 minute samples:

$$\text{Hct} = 1 - \text{Plasmacrit} = 1 - \frac{\text{Counts/cc. whole blood}}{\text{Counts/cc. Plasma}}$$

9. Calculate zero time whole blood activity by proportionality:

Zero time counts/cc. Whole Blood = Zero time counts/cc. Plasma × Plasmacrit

10. Calculate blood volume:

$$\text{B.V.} = \frac{\text{Total counts injected}}{\text{Zero time counts/cc. whole blood}}$$

11. Pool plasma samples, determine iron concentration on duplicate aliquots.

12. Calculate daily plasma iron clearance.

Fe cleared/day =

$$\frac{16.6 \times \text{Fe}_{pe}\text{ mg\%} \times \text{P.V. (in 100 ml's.)}}{\text{T}/2\text{ (hours)}}$$

13. Obtain blood samples (2 ml., heparinized) at 3, 7, and 14 days. Count 1.0 or 2.0 ml. aliquot and hematocrit.

14. Determine approximate per cent red cell incorporation of $Fe^{59}$:

$$\%\text{ uptake} = \frac{\text{Count/ml. follow-up blood sample} \times 100}{\text{Zero time count/ml. whole blood}}$$

15. Calculate Hgb. production per day:

$$\text{Gms Hgb. Produced/Day} = \frac{\text{mg. plasma iron cleared/day} \times \%\text{ uptake}}{3.34}$$

16. Calculate total body hemoglobin:

Blood volume (in 100 ml's) × Hgb (gm. %) = Total gms. hgb.

17. Calculate % daily replacement Hgb.:

$$\%\text{ Daily Hgb. replacement} = \frac{\text{Gm. Daily Hemoglobin Production} \times 100}{\text{Total Body Hgb.}}$$

18. Calculate average red cell life span:

$$\text{Average red cell life span (days)} = \frac{100}{\text{Per cent daily Hgb. replacement}}$$

In the above calculations, radioactive decay has not been mentioned. All counting rates are assumed to have been corrected for background counts and radioactive decay before being used for calculations. If the counter used is very stable, decay corrections calculated on the basis of the half life of $Fe^{59}$ of 47 days may be used. In general, it is more reliable and just as simple to keep a sample of the initial iron preparation as a standard, and to correct observed counting rates by a factor:

$$\frac{\text{Initial counting rate of standard}}{\text{Counting rate of standard on day of sample counting}}$$

For the normal adult with a normal hemoglobin level, values for the above observed and calculated data are:

| | |
|---|---|
| Plasma iron half-time of disappearance | 1-2 hrs. |
| Plasma iron concentration | 60-110 ug. % |
| Hemoglobin concentration | 13-16 gm. % |
| Blood volume | 80-90 ml. Kg. |
| Hematocrit | 40-50% |
| Plasma volume | 40-55 ml/Kg. |
| Per cent incorporation of radioiron into hemaglobin | 80-95% (corrected) in 7-10 days |
| Daily iron clearance/100 ml. plasma | 0.7-0.8 mg. |
| Daily iron clearance/100 ml. whole blood | 0.4 mg. |

*continued on next page*

| | |
|---|---|
| Daily hemoglobin formed/ 100 ml. whole blood | .11-.13 gm. |
| Per cent daily hemoglobin replacement | 0.8-0.85% |
| Red cell life span | 110-125 days |

## PART II

### *Interpretation*

For the purpose of interpreting the radioiron turnover data, hematopoietic disorders may be classified on a functional or dynamic basis as follows:

1. Iron deficiency anemia
2. Hemolytic anemia
3. Hypoplastic anemia
4. Blood loss anemia
5. Polycythemia
6. Miscellaneous conditions
   a. Pernicious anemia
   b. Mediterranean anemia
   c. Anemia associated with cancer and infections
   d. Hemochromatosis
   e. Combinations of conditions

1. *Iron deficiency.* The hematopoietic tissue is functionally normal and very active; the red cell life span is normal; and the plasma iron concentration is low. Because of the decreased hemoglobin concentration, the avidity of the bone marrow for iron is increased, resulting in an increased rate of plasma iron clearance. With the low plasma iron concentration, the percentage removal of iron by the marrow rises still further in an attempt to increase the total iron cleared. In severe iron deficiency, the half-time may be as short as 15 minutes. This probably represents a minimum value, a limit imposed by the time required for passage of the plasma pool through the bone marrow. The rapid clearance rate in turn maintains a low plasma iron concentration, which may approach the zero level. Since the hematopoietic tissue can function normally, and is usually hyperplastic, the cleared iron is rapidly incorporated into red cells which are released into the circulation. Essentially 100% reappearance in three days has been observed. The red cell life span calculated as described above, has little meaning unless the deficiency is in a steady state. During treatment, many times the normal amount of hemoglobin may be produced per day.

2. *Hemolytic anemias.* Iron supplies are adequate, and hemoglobin production is normal or increased. The red blood cells may be inherently defective or cells may be normal with excess destruction caused by extraneous agents. In response to the resulting anemia, the clearance of iron by the marrow is increased, giving a half-time which may be as short as 20 minutes. The rapid clearance tends to reduce the plasma iron concentration, while the adequate iron stores and return of iron from increased red cell destruction tend to maintain a normal plasma iron concentration. The end result is usually a somewhat reduced concentration of serum iron (30-60 ug. %), although during hemolytic crises the concentration may rise above normal. Since the marrow can respond normally to anemia, at least from a quantitative viewpoint, it will become hyperplastic. The cleared iron will be rapidly and completely incorporated into hemoglobin, giving close to 100% reappearance in 3-4 days. During periods of relative status quo, the calculated life spans will give a close index of the degree of hemolysis, though the relationship will not hold during crises.

3. *Hypoplastic anemias.* Supplies of iron and other precursors for red cell production are adequate, and formed cells are adequate, but bone marrow activity is decreased. Since the utilization of iron is decreased, the plasma clearance rate is slowed, often to half-times of 4-6 hours. As a result of the decreased clearance, the plasma iron concentration rises. In such conditions, the portion of iron going to the storage depots may reach 80-95% of the iron leaving the plasma while only 5-20 per cent will be used in hemoglobin formation. The methods outlined here for computing red cell life span are applicable in hypoplastic anemias except for those of acute origin when the circulating hemoglobin level has not yet come into equilibrium with the rate of production.

It is to be accented that the rate of exchange of plasma iron with storage depot iron offers an upper limit to the length of the half-time. Even with completely aplastic erythropoietic tissue, this exchange will usually limit the half-time to 8-10 hours. The observed half-time will be a result of the two half-times—that to the storage depots and that to the marrow—according to the equation:

$$\text{Observed } T/2 = \frac{\text{Marrow } T/2 \times \text{Depot } T/2}{\text{Marrow } T/2 + \text{Depot } T/2}$$

Thus, if the marrow $T/2$ is 16 hours, and the depot $T/2$ is 8 hours, the observed plasma clearance $T/2$ will be:

$$\text{Observed } T/2 = \frac{16 \text{ hrs.} \times 8 \text{ hrs.}}{16 \text{ hrs.} + 8 \text{ hrs.}} = 5\tfrac{1}{3} \text{ hrs.}$$

In this case the depot clearance is of considerable importance. In a normal person with a marrow clearance $T/2$ of 1 hour, the effect of a depot clearance $T/2$ of 8 hours will be small, as:

$$\text{Observed } T/2 = \frac{1 \text{ hr.} \times 8 \text{ hrs.}}{1 \text{ hr.} + 8 \text{ hrs.}} = 53 \text{ minutes.}$$

If the depot clearance $T/2$ is greater than 8 hours, the influence on the over-all $T/2$ will be even less.

*continued on page 394*

# THE CHALLENGE OF SCIENCE*

CHARLES H. SMILEY, PH.D.

The Author. *Charles H. Smiley, Ph.D. Professor of Astronomy, Brown University; Awarded Franklin L. Burr prize, National Geographic Society, 1948; Past President, American Association of Variable Star Observers; Member, Council of the Institute of Navigation; Fellow of the Royal Astronomical Society of England, and of the American Association for the Advancement of Science; The only American to have led 10 solar eclipse expeditions outside the United States.*

I AM GOING to speak about a subject that is of great interest to me, and I hope will be of interest to you. It is the matter of the recruitment of young people to go into science, into mathematics, into medicine.

It is a serious problem that has been discussed a great many times in newspapers and in the magazines. If you have looked at this week's copy of LIFE, you will find there some discussion of this problem.

You will hear that the Russians are not yet ahead of us in this matter, but that they soon will be. You will read that there are about 800,000 American engineers and scientists and 650,000 Russian technologists. We are a little bit ahead, but if our current rate of turning out engineers and scientists continues, by 1960, we are told, Russia will have 1,200,000 scientists and engineers, and we will only have 900,000.

I want to hasten to say that I do not consider that you can measure progress by these facts alone; that there is more to this problem than just numbers; it is more than just dollars. Although from time to time you hear a program in research characterized as a $50,000,000 program, or a $64,000,000 program, or a 2,000-man research group, I think it is a mistake to count the numbers alone. I would urge that we think seriously of the ideas that are involved.

I feel that we have several weaknesses in American science at the present time. I would put first the lack of teachers, and this is a very serious matter because if you lack teachers, you not only fail to produce scientists for the next generation but you also fail to produce teachers for the next generation.

There is a serious deficiency in the number of recruits—young people—going into science, engineering, medicine.

I am going to say tonight that we have serious deficiencies in mathematics and electronics. And I wonder how many of you could guess what the third one is going to be? Imagination!

That will worry you a little bit, until I get to it, but give me time. May I start with the teachers?

Many times we say that it is a matter of pay, and it is partially that. I have just been reading figures. In the forty-nine years between 1904 and 1953, the average pay of a college professor in the United States, in real purchasing power, dropped 2 per cent, while in the same time, railroad firemen and auto workers had their pay go up 140 per cent in real purchasing power.

I meant to ask my friend at the head table for some figures on doctors' remuneration. I did get one or two figures there. I understand they are somewhere in between professors and firemen in the increase. Not startling, certainly.

Now what are you going to do about it? Recently I read in the newspapers of one distinguished gentleman's saying, "There must be no raiding of the college faculties. Even if you need scientists, we must keep our faculties intact." I was sorry to hear that, because every college professor cherishes the illusion that if he were suddenly fired, he could go outside and earn twice as much money somewhere else. And if you make it impossible for him even to think of making the change, you are taking something very valuable away from him.

I will tell you also, in confidence, that when the students get together for a good bull session, there is no topic they enjoy better than whether Professor So-and-So could make a living if the university happened to fire him.

We have heard another man suggest that what we need is more efficiency, longer teaching hours, more months in the year. I have never been one who has felt that teaching can be measured in hours. It is important that we have the time with the students, but you can't say that this twelve hours is important and that twelve more would be twice

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*Presented at the Annual Dinner at the 145th Annual Meeting of the Rhode Island Medical Society, at Providence, Rhode Island, May 3, 1956.

as good. I know it is rank heresy, and I hope nobody will report me to the president of Brown, but I think we could even do with more vacations.

As evidence, I would like to point out that it was on an enforced college vacation that Isaac Newton did his first work on the law of gravitation. A plague visited the college and it closed down. Isaac went to his grandmother's farm and started to work on a problem, the solution of which was to be tremendously valuable to us later.

### *Importance of Being Appreciated*

What the teachers need at the present time, and I am thinking particularly of the secondary school teachers, is appreciation. It would be nice now and then, if there were a party, say of this size, with distinguished people in the community honoring some outstanding secondary school teacher, not just as one person, but as a representative of the group.

The Sigma Xi Chapter at Brown University has in recent years attempted to pick out one outstanding teacher, not necessarily *the* outstanding teacher in Rhode Island, but an outstanding teacher in science teaching in secondary schools. There was only a $50 award—fortunately no income tax on it, so it is $50 clear—and a pat on the back.

The Providence Journal has cooperated in this, and they have arranged for us to invite, at their expense, twelve science teachers from the secondary schools, also outstanding teachers. In five years we have had five outstanding teachers to receive awards, and sixty people to get a pat on the back, and I think I can already see a little profit in this venture. Not that they are doing any better work, but that the communities in which they reside are aware of the good work they have been doing. To me it has been fun, and I must confess that at the dinners, when we sit down together, I look around at these people and listen to their enthusiastic approach to their work, and I think how proud we ought to be here in Rhode Island to have them working with us.

I hope I won't sound critical, but it wouldn't do a bit of harm if we gave one or two honorary degrees now and then to a secondary school teacher. I checked up this afternoon, and from the president's office at Brown, I learned that in the last ten years approximately ninety-five honorary degrees have been given. Twenty-seven were given to people in the field of education. That, of course, is appropriate, considering that we are an educational institution. Of the ninety-five, two went to people in secondary school teaching. I think it might have been five, but then, of course, I am biased.

Now, taking the next problem, what makes for recruitment of scientists? Good teaching helps, but poor teaching does, also. May I confess that I wanted to go into astronomy because the professor of astronomy I had made me wonder if I couldn't do a better job. It is the cockiness of youth, at that age when you are so sure you can do a better job. I am not so sure now, but I have enjoyed trying.

We have the Science Fairs in our communities. Here in Rhode Island we are fortunate in having an excellent one. I don't know whether you have been out to see it. I know some of you have, because as I understand, two awards were given by the Rhode Island Medical Society to students participating. I think that is wonderful.

I don't believe we can properly evaluate these Science Fairs at the moment. We are getting young people started early. We are giving them an enthusiasm and an interest.

I must confess, if it were left to me, I would have a rule that any device that makes a sound would be prohibited. The cacophony of noise, the chaos—it is the Tower of Babel, without any intelligible sound, when their devices really get going.

We have had also here in Rhode Island the Westinghouse Science Talent Search, where our young people compete with young people all over the country. I have been proud of the way our high school seniors have come through. To me it means not only that the teachers have been giving them a good start, but that the youngsters themselves are pushing, and in the end, it is what the student does under his own power that counts. The teachers can only get him started.

We were speaking of the Science Fair. If you happened to go out to see the Rhode Island Fair this year, you will realize that many students will enter the field of medicine. How many exhibits there were on the heart! President Eisenhower's heart attack had unquestionably started a lot of students thinking about it. This is the "coincidental" way of getting men started in science.

### *Science Needs*

May I go back for a moment and look at the situation? What do we need in science? We need a man with an understanding of mathematics. That is probably the place where we are weakest, and I am told on good authority that if our students are going to be good in mathematics, we ought to get them started about the sixth grade. If you don't catch a man before he has finished high school, there isn't much chance of making a good scientist out of him,—a little, perhaps, but there is a much better chance if you catch him early.

Do you realize that mathematics is many times taught in schools by people trained in other areas? That the qualification to teach depends not on the number of courses a man has had in mathematics, but on the number of courses in "education?" That

many times mathematics is taught by part-time teachers with no particular enthusiasm for the task? It is depressing, but it is true, and I am afraid at the present time that we are trying to produce mathematicians from people who got off to a very poor start by not having a proper training in junior high school and high school.

What would my solution be? Of course, we have got to start training mathematics teachers, and we must see to it that we keep them teachers. We must give them the backing they need, and pay the salaries that we will have to pay. I would urge us seriously to consider sabbatical leaves for our best teachers.

I know this will horrify some people, but as a professor who is now looking forward to a full year's sabbatical leave, to get away from the regular job, to look back on it, to do some research, to read, and even just to sit and meditate,—I feel strongly it would be worth while.

It is true that I have had two successful eclipse expeditions in two years, and that leaves me four years behind in writing up my papers. I have a lot to do, so don't think I am going to loaf. But I do think we could try it out on a small scale in the secondary schools and I believe that it would pay.

If you think I am exaggerating in this matter of mathematics, may I point out, that at Ohio State University last fall, mathematics tests were given and they found 66 per cent of the entering class deficient in mathematics. And in the tests given to the people entering the College of Education, they found 82 per cent were deficient in mathematics. It is a little bit horrifying when you think that those people will soon be teaching mathematics.

Now let's move on to electronics. I can be more cheerful here. It is my opinion that we are going to take care of electronics in the same way we have taken care of mechanics in other years. Our boys are better trained in automotive engineering than any other similar group on earth. It is the story of the jalopy. A boy buys a car, takes it apart, puts it together again, and repeats the process, and struggles to keep it going. It is a splendid education. I think you are going to find our youngsters putting together electrical equipment, including transistors, and we shall have experts before they come to college.

We will have youngsters who can read charts, and know how to hook up a given electronic circuit. If you went to the Science Fair, you will know we don't need to worry. We ought to be thinking about it, and giving the youngsters a chance, and we ought to make available to them the equipment they need. In this connection, it appears likely that we are going to be faced in the next few years with all kinds of assistance. I have been telling my colleagues in the teaching profession that we should make sure that we get the help we *want*, and I have been urging that we get together and organize a Rhode Island Science Council,—or you may call it an Academy of Science, if you wish—with this purpose in mind; that we would bring together the secondary school teachers in science, the college professors in scientific departments, and people in the community with an interest and a background in science.

If we can get these people together, we might perhaps speak with authority on what ought to be done, avoiding a duplication of effort. I hope that this effort will go through. Dr. Lawson sat in with us at the early meetings, and we hope to have his valued counsel in the later work.

### *Imagination Most Important*

Now I come to the most important part, "Imagination." Do you realize that many times in the course of our educational process, we deprive a student of practically all the "bounce" his imagination ever had? A youngster, just some little fellow, comes home and tells his family he met lions on the street. What happens? He is definitely discouraged. He tells tall tales, delightful tall tales, and his family spanks him. By the time he is through college, he is a pretty solemn-faced individual.

We need this imagination to reach up and get out of the ruts into which we get. We need to be able to see out, and think of the things that are impossible, and then try to do them. After all, many times the thing that looks impossible today becomes possible tomorrow. We need people of courage, vision, imagination.

Now may I confess that our students frequently show this quality best in their mischief. I feel that in general, if a youngster manages to get into some interesting mischief that has variety, that isn't just simply a repetition of the old things, particularly if he manages to do this without causing anybody any permanent harm, or making anyone very unhappy; if he has a bit of fun out of it and shows real originality, then I think it holds promise for the future.

What do I mean by imagination? I would introduce to you, our Professor Josiah Carberry. He doesn't exist, but he is a most interesting soul.

Just recently I wanted to see what kind of "bounce" my students' imagination had, whether it had any "give" to it. I said, "Here are the usual five questions: you will get 100 per cent if you answer them, and a sixth question will get you 5 per cent more. You don't have to write it if you don't want to. Discuss the astronomical work of Josiah Carberry."

May I tell you the best answer, in my opinion? "The Professor of Ceramics at Brown has invented a wonderful lens, a ceramic lens, which is strong,

*concluded on page* 406

# RECENT ADVANCES IN PLASTIC SURGERY*

RICHARD P. SEXTON, M.D.

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BEFORE DISCUSSING recent advances in plastic surgery, we would do well to look into the past. Historically, procedures that now fall into the field have been described as far back as 2000 to 3000 B.C. by the Egyptians. The Hindus about 700 B.C. became adept at the reconstruction of noses, utilizing forehead flaps, since an ancient form of punishment for infidelity was to cut off the nose. Knowledge passed on to Rome about the time of Christ, and Celcus in his book, DE RE MEDICA, mentioned operative procedures on the eyes, harelips, syndactylism, etc.

Tagliacozzi, in Italy, in the latter part of the sixteenth century, wrote the first textbook on plastic surgery, and it is his famous drawing of the reconstruction of the nose utilizing the arm pedicle flap which is on the shield of the American Board of Plastic Surgery. Unfortunately, the Catholic church considered such surgery sacrilegious, believing that these deformities were God's will and hence should not be tampered with. With this decree from the church, plastic surgery again regressed until the nineteenth century.

At that time skin grafting was developed by Reverdin, Ollier, Theirsch, and Wolfe in Europe, and Warren, Pancoast, and Mettauer in the United States. Modern plastic surgery evolved from the First World War when such men—mostly former dentists—as V. P. Blair, Robert Ivy, V. H. Kazanjian, and Ferris Smith were assigned to maxillofacial centers and, in conjunction with a British group headed by Sir Harold Gillies, branched out from maxillo-facial work to general plastic surgery. V. P. Blair with J. B. Brown in St. Louis, advanced the skin grafting field immeasureably by introducing the split-thickness skin graft. E. C. Padgett helped even more with his drum dermatome, and less than ten years ago the Brown Electric dermatome was introduced which made taking skin grafts as easy as the morning shave.

As in many specialties, the plastic surgeon works best and most efficiently with the mutual cooperation of all other departments of the profession—medicine, surgery, urology, dental, nose and throat, orthopedic, dermatology, pediatrics, etc.

Needless to say, many of the recent advances in plastic surgery deal with the treatment of old, well-known conditions. For instance, harelips were repaired as far back as the time of Christ by paring the edges or cauterizing them and holding them together. About twenty-five years ago, great advances were made by undermining and relaxing the cheek skin and using local flaps. Recently, LeMesurier in Canada introduced a quadrilateral flap which reconstitutes the Cupid's bow effect and at the same time breaks up the vertical suture line which used to contract and cause the well-known "whistle" deformity.

Palate repairs have been improved within the past ten years by elevating complete muco-periosteal flaps and hence relieving tension. The major improvement in the treatment of cleft palates is the realization that it, above all, is a group project and the patient should be followed until he has been completely rehabilitated, mentally and physically, and has good speech. This involves plastic surgeon, dentist, orthodonist, prosthodontist, speech therapist, psychiatrist, and social worker. We now have such a clinic at the Rhode Island Hospital.

In order to improve speech, a pharyngeal flap operation has been devised to hold the soft palate back to the pharynx. A pedicle flap is elevated from the posterior nasopharynx based either inferiorly or superiorly and sutured to the posterior portion of the soft palate where, as it heals, it pulls the soft palate back to create better velopharyngeal closure.

A relatively new syndrome called the Pierre-Robin syndrome has recently been attacked surgically. In this syndrome there is a cleft of the soft palate and a marked retrusion of the mandible which results in a precarious situation in the early days and weeks of life since these babies tend to occlude their airway because the tongue falls back. This results in episodes of cyanosis, often resulting in death, and difficulty in feeding. The new surgical approach is to suture the tongue to the lower lip, denuding a surface of each, and leaving it sutured until the teeth begin to erupt after the sixth month. This usually takes them over the precarious period

*Delivered at the 145th Annual Meeting of the Rhode Island Medical Society, at Providence, Rhode Island, May 2, 1956.

and usually the child develops a normal chin in the succeeding years.

For mandibular prognathism and retrusion, the horizontal ramus of the mandible has been sectioned, maintaining the dental nerve and advanced or recessed. Many times, if dental occlusion is good, it is sufficient to implant a cartilage or bone graft as an onlay graft in the mental region.

### *Cosmetic Surgery*

In the purely cosmetic surgery field, advance has not been remarkable. New instruments have been devised for the removal of the nasal hump which makes the rhinoplasty an easier operation. Face-lifting remains about the same with the results being temporarily good, but within three to six years it is usually necessary to reoperate. The latest gimmick in breast reductions is a preformed form, somewhat like a pie cutter, which is said to make the operation easier. Nipples are being transplanted freely as free full-thickness grafts and surviving very well. This makes the reshaping of the breast somewhat easier since the freely transplanted nipple can be placed anywhere at the termination of the procedure.

Sandpaper surgery has received great publicity in the lay press, which is unfortunate. Patients come in with the idea that they can now have skin like a baby's instead of like an elephant's. This procedure usually *improves* the appearance of the skin, particularly if there are deep acne pits, and makes makeup easier to apply. It also improves the appearance of old scars, particularly if they are uneven.

One of the most satisfying procedures that we are called upon to do is the pinning back of the prominent ear. This condition creates one of the most prominent psychological handicaps with which a child or an adult is faced, and its treatment is usually gratifying both to the patient and the surgeon.

In the skin grafting field, the Brown Electric Dermatome has been the greatest advance in recent years. This machine resembles an electric hair clipper and with very little practice it is possible to take a graft from one end of the body to the other. Free *full*-thickness skin grafts are being used, particularly in facial defects, taking care to match the skin, color, texture, and thickness as much as possible. Mucous membrane grafts from the opposite conjunctiva or from the mouth should be used to reconstruct the conjunctival sac. Conjunctival skin grafts in the presence of a normal eye are very unsatisfactory.

About eight years ago the composite skin graft, taken from the ear, and containing skin, cartilage, and skin, as a free transfer, has been used to repair defects of the lower portions of the nose. In the treatment of the very disfiguring nasal condition called rhinophyma, the nose has been shaved down to its original shape and either allowed to epithelialize itself or is covered by a split-thickness skin graft. Eyebrows have been reconstructed, utilizing narrow strips of scalp as free transplants taking care to have the hair growing in the proper direction. Free thick split-thickness grafts have been utilized in the treatment of hypospadias to connect the normal urethra to the tip of the glans on the ventral surface of the penis.

Pedicle flaps are still the stock-in-trade of the plastic surgeon. They are still being used to resurface large defects anywhere on the body surface. The present trend is toward the use of local pedicle flaps, particularly in facial work. In any case, the planning and delaying of a pedicle flap is still the most important factor.

Recently split-thickness grafts have been used in a medico-legal aspect in the identification of twins, since it is known that homogenous skin grafts will take only in identical twins, or in the very obscure condition known as agammaglobulinemia—which phenomenon lends credence to the theory that it is an allergic situation which prevents the permanent take of homografts.

In the treatment of small atrophic breasts, large segments of fat, fascia, and dermis have been transplanted from the buttocks region as free grafts to the breasts. One writer states that 80 to 90 per cent of the transplanted graft remains without dissolving. Other means of augmenting the breasts has been the use of plastic sponge material. At the present time we have no accurate follow-up on this method, but in general it has not proved too successful since the fibrous tissue soon grows into the interstices of the sponge and results in a firm, hard lump. Needless to say, this would be difficult to distinguish from a carcinoma and we also do not know the relationship of foreign material to the etiology of carcinoma.

Foreign organic materials have been used to fill out other defects—particularly the face, scalp, and nose. To date these have not proved completely successful, but of foreign materials, polyethylene and allied materials seem to be best.

Human cartilage, either autogenous or homogenous, has been used in the reconstruction of various defects, particularly facial, with some success. The use of animal cartilage, particularly bovine, has not been too successful. Homogenous cartilage is readily preserved in aqueous merthiolate in a normal refrigerator.

Autogenous fascial strips still remain the material of choice in the treatment of facial palsy. These strips are removed at the time of operation and embedded in the subcutaneous tissue of the cheek. These strips are motivated by the temporal muscle and recently the anterior segment of

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the masseter muscle is attached to the corner of the mouth, giving a more natural expression. Autogenous fascial strips are also utilized in some cases of ptosis. Another recently introduced method of correcting ptosis is by using a segment from the upper portion of the orbicularis oculi muscle.

### *Traumatic Hand Injuries*

The Second World War brought about great advances in the treatment of traumatic hand injuries. The fundamentals of hand surgery have been stressed repeatedly, particularly splinting in the position of function and the covering of exposed tendons, nerves, and bones with local or distant pedicle flaps. Fingers have been transposed on their neurovascular pedicles from one position in the hand to another to create a better functioning hand and have proved very successful. Transfer of the index finger to substitute for the thumb is a great advance over the use of a sensationless stump of abdominal skin containing bone. Toes have been transferred to fingers, also with their neurovascular pedicles and tendons. Free grafts of fingernails for cosmetic reasons have proved better than 60 per cent effective.

Several papers on the treatment of keloids have been published recently. Vitamin E treatment has proved expensive and of value only in relieving symptoms of itching and burning. There has been no change in the keloid itself. The same is true of the use of hyaluronidase and cortisone. Probably the best treatment remains excision followed by immediate X-ray therapy.

In the treatment of rectal incontinence due to lower spinal cord failure, the gracilis muscle has been transplanted from the medial thigh to serve as an anal sphincter. This muscle derives its nerve supply from L2 to L4 and is inervated in its upper third. The results have been very satisfactory in clinical trial, particularly in children, and they are now trying it as a substitute for the urethral sphincter. In the treatment of hidradenitis suppurativa, or multiple sinuses of the inguinal, perianal, and axillary regions, good results can be obtained by radical excision of these areas followed by immediate split-thickness skin grafts.

The open treatment of burns, introduced in England about eight years ago, has been greeted by mixed feelings, mostly good. Statistically, it is apparent that the open treatment results in the necessity for less grafting. It is easier on the hospital personnel and on the patient also. In my experience in several different hospitals, it is apparent that the proper application of a pressure dressing is a lost art and an improper pressure dressing can do more harm than good. Advocates of the open method of treatment stress the fact that bacteria enjoy a warm, dark, moist environment which is present in a pressure dressing as opposed to a cool, light, dry environment of the open method.

### *Experimental Research*

In the experimental field, much work has been done on homografts of skin. At the present time it is felt that the reason homografts do not survive is probably due to an allergic mechanism. Under various conditions they survive for periods of two weeks to three months. Homografts can be stored for periods up to three weeks in saline sponges in a normal refrigerator, or by the use of a glycerine medium and quick freezing may be stored for better than six months. They continue to be of considerable value in the treatment of burns involving a large extent of body area to tide the patient over until his own skin may be used. If homografts are applied in strips, alternating with autografts, larger areas may be covered and as the homografts dissolve, the autografts spread to cover the entire area.

Thoracic skin pedicles have been applied to the heart in cases of experimental coronary insufficiency in dogs with good results. In the abdominal cavity, split-thickness grafts have been wrapped around tubes and buried in the omentum and at a later date have been utilized in the reconstruction of common duct defects in the experimental animal. Also, segments of bowel have been used to fortify the abdominal wall and in some instances a split-thickness graft has been applied and the entire thickness of the abdominal wall replaced. A similar segment of bowel with attached mesentery and intact mucosa has been sutured inside the abdominal cavity with the mucosa exposed in cases of ascites. This resulted in a decrease in the ascites and an incidental finding was that in these experimental animals, no intestinal adhesions occurred with this exposed segment of bowel mucosa. Split-thickness grafts have been used in the abdominal cavity in ureteral reconstruction and as a covering for liver biopsies to control hemorrhage. Free dermal skin grafts have been utilized in body cavities to reinforce suture lines particularly esophageal suture lines and blood vessel anastomoses.

Again I repeat that the plastic surgeon can very often contribute to many of the problems facing the other branches of medicine, surgery, and the various specialties. In some ways it might appear that the plastic surgeon is getting out of bounds, but if he is considered a reconstructive surgeon to aid in a difficult closure or to help plan a difficult procedure in conjunction with other members of the profession, he can sometimes at least help share the burden.

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*concluded on page 406*

# NATIONAL MEDICAL-LEGAL CONFERENCE

## Report on the American Medical Association's Conference for Medical Society Attorneys held in Chicago, Illinois, April 19-20, 1956

**CHARLES F. SHERIDAN, JR., ESQUIRE, of Edwards & Angell, in behalf of the Rhode Island Medical Society, attended the American Medical Association's Chicago conference of attorneys representing national, state, and local associations. Below are Mr. Sheridan's comments on the highlights of this conference.**

**—THE EDITOR**

NEXT TO THE marked increase in malpractice litigation, attorneys for medical societies across the nation are most concerned with the long-range effect of recent court rulings favorable to lay organizations providing prepaid medical and hospital care to a selected group of persons. Activities of medical societies designed to discourage physicians from participating in such plans have been challenged as illegal under the Federal anti-trust laws and, despite a well-established policy against the corporate practice of medicine, nonprofit corporations have been permitted to operate such plans. These cases may foreshadow a general acceptance by the courts of the view that public policy favors the ready availability of medical treatment for the public, free from restraints imposed by professional groups and unhampered by long established policies favoring the "individual" practice of medicine.

### *Health Plans*

In several comparatively recent cases certain medical associations and individual doctors have been charged with restraining "trade" in violation of the Federal anti-trust laws because of their concerted refusal to participate in and deal with lay organizations offering prepaid medical and hospital care.

*American Medical Association* v. *United States* 317 U.S. 519 (1942)

*United States* v. *Oregon State Medical Society* 343 U.S. 326 (1952)

In the American Medical Association case the United States Supreme Court affirmed a lower court decision holding that the A.M.A. and a local medical association of the District of Columbia had acted together and restrained the "trade" of Group Health Association, Inc., a lay organization, which supplied its members with medical and hospital care. Group Health, a nonprofit organization of government employees, employed physicians on a salary basis and sought to provide its members with medical and hospital care on a risk-sharing prepayment basis. The court found that the defendant medical associations had acted illegally in coercing individual physicians into refusing to treat and consult with Group Health members and salaried physicians and by restraining hospitals from accepting Group Health members. The court held that Group Health's business of providing prepaid medical and hospital care was a "trade" entitled to protection under the anti-trust laws. It rejected the defense that the associations' activities were designed merely to punish and prohibit violations of the medical profession's code of ethics.

In the Oregon Medical Society case the United States Supreme Court affirmed a lower court decision in favor of the defendant medical associations and physicians. The defendants were charged with having restrained the "trade" of lay organizations which provided medical and hospital care to their policyholders or employees. Physicians associated with such organizations contracted to treat patients on a salary or fee basis to be paid by the sponsoring organization. The United States contended that the defendants violated the anti-trust laws by enacting resolutions condemning such organizations and doctors employed by them, and by taking or threatening to take expulsion action against such doctors. The court refused to determine whether such activities constituted an illegal restraint on the grounds that this issue was not properly before it in view of the peculiar proceedings instituted by the government. The court found for the defendants with respect to other alleged illegal activities. One of the attorneys at the conference, who acted as an attorney in this case, stated that had the court found it necessary to rule on the alleged restraint of trade, it might well have found adversely to the defendants on that issue. It was also reported that a case is now pending in the District of Columbia in which a group of podiatrists have charged that their "trade" has been restrained because of their exclusion from a prepaid health plan sponsored by the medical profession.

*continued on next page*

### *Corporate Practice of Medicine*

A lay sponsored prepaid medical care plan also was the subject matter of a recent case before the California Supreme Court wherein it was held that a nonprofit corporation could practice medicine.

*Complete Service Bureau* v. *San Diego County Medical Society*
272 P2d 497, 501 (Cal., 1954)

The heretofore generally accepted rule prohibiting the corporate practice of medicine is no longer universally followed in this country. Some states, Oregon for example, have authorized such corporate practice by special statute. The decision of the California Court was not based upon a special statute. There the court held that a lay sponsored nonprofit corporation was properly organized under the general corporation law to provide its members, who made periodic payments, with medical services at reduced rates. Patients were billed for medical services by the Bureau which in turn compensated member physicians on a unit basis. The court was influenced by the existence in corporate form of a competing prepaid health plan sponsored by the medical profession. It stated that the public policy against the commercial exploitation of the practice of medicine was "not contravened by permitting a group of interested persons to form a nonprofit corporation to secure for themselves medical services at a low cost." The Complete Service Bureau case seems to go beyond the mere authorization of the practice of medicine by nonprofit corporations. Certain percentages of the medical fees collected from the Bureau's members were paid to its business manager as compensation for his services and to a realty corporation as rent. The realty corporation was organized for profit. Two judges dissented from the majority decision because of these profit making features. It should be noted that there are recent decisions by the courts of Iowa and Colorado holding that the corporate practice of medicine is illegal whether it be by a profit making or a nonprofit corporation. A hospital which renders a separate charge for the services of its pathologist and radiologist should limit its charges to the amount paid them as salaries.

Those attending the conference generally agreed that it is desirable to deal with cases of objectionable corporate practice by other means than by litigation. In fact, in this period of great social change, the attorneys agreed that litigation should be avoided whenever possible because of the danger that policies unfavorable to the medical professions may become established.

### *Malpractice*

Considerable discussion was also devoted to the tremendous increase in malpractice litigation, its causes and the effectiveness of grievance procedures as a means of reducing such litigation. This subject was more thoroughly covered in a series of A.M.A. nationwide conferences held in 1955. Opinion was sharply divided as to the workability of such procedures. It was generally agreed that grievance procedures were not effective unless backed up by disciplinary action. However, it was thought that the general application by the courts of a public policy favoring the ready availability of medical treatment for the public might result in closer court inspection of disciplinary proceedings because of their effect upon the individual physician's right to practice medicine granted by the individual states. Disciplinary action was recommended by a majority of those attending this conference as an effective means to avoid the bad publicity and higher insurance rates that result to the whole profession from the improper practices of a few. Several associations recounted experiences in successfully resisting attempts by insurance carriers to charge excessive rates for malpractice insurance.

### *Cooperation with the Legal Profession*

Many societies recommended the adoption of interprofessional codes of conduct establishing principles for cooperation between the medical and legal profession with respect to litigation involving a mutual patient-client. Such codes are not designed merely for the unruly. They cover such items as the protection of the physicians' fees, arrangements as to subpoenas and pretrial reports and conferences. They are definitely beneficial as they resolve serious points of friction that constantly arise in the working relations between the two professions.

### *Tax Exemption for Associations*

Some discussion also took place with respect to the tax exemption enjoyed generally by medical associations and the danger that this exemption may be lost as a result of certain association activities. Such activities would be those bringing substantial income to the association such as the sponsorship of a prepaid medical service plan or the publication of medical journals. Lobbying activities may also prejudice the tax exempt status of the society.

## CONCLUSION

We have not attempted to discuss the issues raised at the conference as they affect conditions here in Rhode Island. Such conditions will necessarily have to be reviewed on an individual basis. However, organized medicine in Rhode Island should be made aware of the existence of these issues so that its future activities will be adopted with them in mind. We would like to commend the A.M.A. for sponsoring this and other similar conferences which have provided an excellent forum for the dissemination of legal information of increasing importance to all doctors.

# The RHODE ISLAND MEDICAL JOURNAL

*Owned and Published Monthly by the Rhode Island Medical Society*

*106 Francis Street, Providence, Rhode Island*




## THE NEW EDITOR — DR. JOHN E. DONLEY

As the fifth editor in the thirty-nine-year history of the Rhode Island Medical Journal the Committee on Publications of the Society has selected Dr. John E. Donley, of Providence, to succeed the late Dr. Peter Pineo Chase who had held the office from 1942 until his death this year.

In Doctor Donley the Committee recognizes one of Rhode Island's most erudite scholars, and one of the medical profession's most distinguished members.

He is a graduate of Classical high school and he received his Bachelor of Arts and Master of Arts degrees from Seton Hall University before completing his medical studies at the University of Pennsylvania. Providence College, as well as Seton Hall University, have honored him with Doctor of Laws degrees for his outstanding work in medicine.

Doctor Donley is a past president of both the Providence Medical Association and of the Rhode Island Medical Society. In 1953 he received the State's award for outstanding service to the disabled in Rhode Island, and the City of Providence awarded him the Charles V. Chapin Medal in 1955.

Under the editorship of Doctor Donley we are assured of the continued high standing of this publication established by his capable predecessors—Drs. Roland Hammond, Frederick N. Brown, Albert H. Miller, and Peter Pineo Chase.

*The Committee on Publications*

*continued on next page*

## ANEMIA

Although anemia is one of the common symptoms encountered in medical practice, its exact cause, whether it be blood destruction, blood loss or failure of the bone marrow, is at times difficult to determine. An even more serious problem besetting the physician is the degree to which these three factors contribute to the anemia. The availability of the red cell survival test by means of labeling with radio-active chrome has been of great help in elucidating red cell destruction. The modification of the "Radioiron Turnover Test" described by Doctor Loeffler in his Caleb Fiske Prize Essay (see page 371) enables the physician to gain further insight into the dynamics of a given anemia. In particular, there is no other test available at present to evaluate the degree of bone marrow failure. Doctor Loeffler takes great pains to explain the principles and application of the test. His vast experience allows one to gain insight into the advantages to be derived from the test.

## THE COMMUNITY HOSPITAL

When one considers the work of the medical profession in any state or nation, it is the great teaching institutions that immediately engage attention. Admittedly, it is in them that the greatest advances are made in clinical investigation and in them the teaching of residents in the various specialties is best accomplished. Nevertheless, the sick and injured people of the United States who are treated in community hospitals not affiliated with medical schools by far outnumber those who are patients in the so-called "teaching hospitals."

In New England, for example, of the more than 35,000 beds in the civilian hospitals which deal with acute medical and surgical conditions, only a few more than 7,000, or one fifth of the total, are in hospitals which have a university affiliation. Thus it is clear that in this area the bulk of patient care is carried on in hospitals which are called "non-teaching." It is, then, by the quality of this practice, representing as it does approximately four fifths of the clinical care of patients in hospitals of this area, that New England medicine must be judged.

If we look further into the matter, we find that slightly more than one half of these community hospitals are approved for the training of interns and participate in the "Intern Matching Program." There are over 14,000 hospital beds in this group, about half of which are in hospitals of from 100- to 300-bed capacity. It is of interest to note that in 1955 these 36 hospitals of 100-300 beds succeeded in obtaining but 33 of the 192 *interns* they had requested under the matching plan. This means that they had to fill their quotas by the appointment of foreign-trained physicians. It is also of interest to note that these hospitals are all carrying on educational programs and are attempting to give their interns valuable clinical training. Despite the doubt expressed by a few individuals whose experience is principally in the "ivory towers" of academic medicine, the efforts of these hospitals in this field are real, earnest and reasonably successful.

Dr. Harvey B. Stone, formerly associate professor of surgery at Johns Hopkins University, has expressed the opinion[1] that it would be well for the medical schools to do away with internships in university hospitals and send their graduates to community hospitals, where they can achieve much more intimate contact with the problems of sick patients and do not become the "forgotten men" between the fourth year medical students below them and the residents above them in the hierarchies of the university hospitals. This would mean more American-trained graduates for American community hospitals. As has been pointed out, it is in these hospitals that the average American citizen is treated and the average American physician practices. It is in them that the bulk of American medical practice is carried on, and by their work American Medicine must be judged.

ALEX M. BURGESS, M.D.

## THE NEW PRESIDENT OF AMA

Dwight H. Murray of Napa, California, the new president of the American Medical Association, is the first general practitioner to head the Association in many years.

Although actively engaged in general practice, Dr. Murray has found time to be a member of the Board of Trustees of the AMA for a period of ten years, the last four of which he served as chairman. Prior to this, he served as a delegate from California from 1943 to 1945. He is the past president of the Napa County Medical Society, and also served as delegate to his State Association for several terms.

He was born May 16, 1888, on a small farm in Lawrence County, Indiana, about three miles outside the Village of Springville.

His formal education began in a one-room country schoolhouse, and at the fifth grade he was transferred to the public schools of Springville.

He had to finance his premedical education in Indiana University as a school teacher in Springville and Colitic, Indiana, over a period of eight years. He worked his way through medical school, and there developed the ability, which he still has, of getting by with just five or six hours of sleep each night.

[1]Filling the gap between Academic Medicine and Medical Practice, by Harvey B. Stone, M.D., J.A.M.A. 160:1298, Apr. 4, 1956

He served as a Lt. jg. in the Navy Medical Corps in World War I. He began practice in 1922 and has always been active in civic affairs and exercised leadership in community health matters.

Over the years his deepest concern was to give the best medical care to children of parents who sometimes could not afford to provide even the barest necessities of life.

To keep abreast of what's new in medicine, Dr. Murray adheres to a rigid schedule, and over the years has made it a practice to spend a certain number of hours each week reading medical journals. In addition, he attends refresher courses and a select number of medical meetings.

Doctor Murray is a genial "family type" physician. Typical of the man is this quotation from one of his talks to a group of physicians:

"I plead for your understanding of the economic and social problems encountered by your patients; and the best way to find out about the way they live and work and play is to get out and become part of the community yourself."

## HOSPITAL ACCREDITATION

A long step forward was taken by American medicine when the House of Delegates of the American Medical Association gave its approval (at the recent meeting in Chicago) to the report of the Stover Committee created one year ago to review the functions of the Joint Commission on Accreditation of Hospitals.

Since January, 1953, this difficult task has been shared by five major medical organizations—the American Medical Association, the American College of Surgeons, the American College of Physicians, the American Hospital Association, and the Canadian Medical Association. Formerly it was the sole duty of the American College of Surgeons, begun in 1920, with the purpose stated ". . . to create in the hospital an environment which will assure the best possible care of the patient."

The criticisms leveled at the commission in the first two years of its existence have been carefully scrutinized by the review committee. The justification of many complaints, coming from accredited as well as non-accredited institutions, became obvious and corrective measures were suggested. A greater number were purely local problems that were automatically self-adjusted with a better understanding of the basic principles necessary for accreditation of a hospital by the Joint Commission.

An equally important feature of the report is contained in the conclusions, which are to be found elsewhere in this JOURNAL (see *Report of A.M.A. Delegates,* page 388) suggesting an annual report from the board of trustees of the American Medical Association to the House of Delegates on the action of the Joint Commission, as well as educational meetings and campaigns designed to implement the knowledge not only of doctors, but also of hospital boards of trustees, administrators and their staffs and nursing personnel concerning the methods of operation and the general functions of this Joint Commission on Accreditation, the purpose of which is so necessary, and its accomplishment so difficult.

A better understanding of these basic principles and the standards for methods of procedure regulating the conduct of the Commission would do much to strengthen the tripod upon which all hospitals stand—namely, administration, medical staff and nursing.

## WHERE WERE THE DOCTORS?

Why were not more physicians present at the Annual Meeting of the Rhode Island Medical Society in early May, 1956? The business of planning for the meeting and the arrangements were completed. The members of the Rhode Island Medical Society had been alerted several months before and afterwards notified by letter, postal card, and this JOURNAL.

The speakers, eminent physicians, had come well prepared (some from considerable distances and at considerable expense) as a result of careful selection by the program committee. Some of the foremost drug firms in the country had assembled their exhibits and their representatives were ready and waiting. The weather was good and the newly decorated auditorium in readiness.

But where were the members of the Society?

The 1956 Annual Meeting was a success but the attendance should have been much better. On the first day the session on General Practice opened before an almost empty house. The specialists, in particular those in the highly trained groups such as ENT, dermatology, and pediatrics were conspicuous by their absence. On the last day of the meeting the Woonsocket, Westerly, Newport, and Pawtucket local societies were practically without representation. This neglect of their own Society is strange and to be deplored since the physicians of Rhode Island have an enviable reputation for attending other state and national meetings.

Gentlemen, the annual meetings are arranged for you. *Why don't you attend them?*

## LIBRARY HOURS

***From August 1 through Labor Day***

***(September 3)***

**The Medical Library will close at 1:00 P.M. each day. Library hours during this period will therefore be from 9:00 A.M. to 1:00 P.M., Mondays through Fridays.**

# AMA DELEGATES' REPORT
# 105th ANNUAL MEETING OF THE AMERICAN MEDICAL ASSOCIATION
## at Chicago, Illinois, June 11-15, 1956

CHARLES J. ASHWORTH, M.D., *Delegate,* and ARTHUR E. HARDY, M.D., *Alternate Delegate*

THE UNANIMOUS and unopposed election of Doctor David B. Allman of Atlantic City, New Jersey, as president-elect to succeed Doctor Dwight H. Murray who took office at this session, marked the closing hours of the House of Delegates of the American Medical Association at its 105th annual meeting in Chicago, June 11-15. A member of the board of trustees for the past five years, Doctor Allman has also been identified with many of the Association's efforts to provide and maintain the best medical care available in the world, and he is competently qualified by this experience to continue the illustrious traditions of his predecessors as the leader of American medicine.

Included among the many important actions taken by the House at this meeting were policies affecting the private practice by members of medical school faculties, evaluation of foreign medical school graduates, federal aid to medical education, premature publicity on new drugs, and hospital accreditation. The latter subject stands out as a prominent accomplishment. The approval given by the House of Delegates to the report of the Committee to Review the Functions of the Joint Commission on Accreditation of Hospitals, appointed in June, 1955, was well merited. The work of this committee resulted in the following conclusions:

### *Hospital Accreditation*

The House of Delegates approved the report of the Committee to Review the Functions of the Joint Commission on Accreditation of Hospitals, which was appointed by the Speaker as a result of action taken at the June, 1955, meeting. The Committee came to the following conclusions:

"1. Accreditation of hospitals should be continued.

"2. The Joint Commission should maintain its present organizational representation.

"3. The Board of Trustees should report annually to the House of Delegates on the activities of the Joint Commission.

"4. Physicians should be on the administrative bodies of hospitals.

"5. General practice sections in hospitals should be encouraged.

"6. Staff meetings required by the Joint Commission are acceptable, but attendance requirements should be set up locally and not by the Commission.

"7. The Joint Commission should not concern itself with the number of hospital staffs to which a physician may belong.

"8. The Joint Commission is not and should not be punitive.

"9. The Joint Commission should publicize the method of appeal to hospitals that fail to receive accreditation.

"10. Reports on surveys should be sent to both administrator and chief of staff of hospital.

"11. Surveyors should be directly employed and supervised by the Joint Commission.

"12. Surveyors should work with both administrator and staff.

"13. New surveyors should receive better indoctrination.

"14. Blue Cross and other associations should be requested not to suspend full benefits to non-accredited hospitals until those so requesting have been inspected.

"15. The American Medical Association should conduct an educational campaign for doctors relative to the functions and operations of the Joint Commission.

"16. The Committee also suggests that the American Medical Association and the American Hospital Association encourage educational meetings for hospital boards of trustees and administrators either on state or national levels to acquaint these bodies with the functions of accreditation."

The House also approved a reference committee suggestion that the following statement be added to the report:

"The Committee recommends that the commissioners to the Joint Commission on Accreditation of Hospitals appointed by the Board of Trustees of the American Medical Association, urge that Commission to study:

"1. The problems of the exclusion from hospitals and arbitrary limitation of the hospital privileges of the general practitioner, and

"2. Methods whereby the following stated principles may be achieved:

*continued on page 390*

DRAMAMINE® IN VERTIGO

1. Bárány Pointing Test. *The patient points at a stationary object, first with his eyes open and then closed. A constant error in pointing (past pointing) with his eyes closed in the presence of vertigo indicates peripheral labyrinthine disease or an intracranial lesion.*

2. The Caloric (Bárány) Test. *The patient sits with his eyes fixed on a stationary object and the external ear canal is irrigated with hot (110 to 120 F.) or cold (68 F.) water. If the vestibular nerve or labyrinth is destroyed, nystagmus is not produced on testing the diseased side.*

3. The Rotation (swivel chair) Test. *The patient sits in a swivel chair with his eyes closed and his head on a level plane. The chair is turned through ten complete revolutions in twenty seconds. Stimulation of a normal labyrinth will cause nystagmus, past pointing of the arms and subjective vertigo.*

## Notes on the Diagnosis and Management of "Dizziness"

# I. Vertigo

The term "dizziness" (vertigo) should be restricted to the sensation of whirling or a sense of motion.[1] This sensation is usually of organic origin and is the tangible symptom of a specific pathology.

Moderate vertigo, with a sense of motion and a whirling sensation, may be produced by infection, trauma or allergy of the external or middle ear. Examination of the ear will usually disclose the abnormality.

Severe vertigo, which will not permit the patient to stand and causes nausea and vomiting, indicates an irritation or destruction of the labyrinth. The specific condition may be labyrinthine hydrops, an acute toxic infection, hemorrhage or venospasm of the labyrinth or a fracture of the labyrinth. Multiple sclerosis and pathology of the brain stem should be considered also.

It is important to learn if the patient's sensation is continuous or paroxysmal.[2] Paroxysmal vertigo suggests specific conditions: Ménière's syndrome, cardiac disease and epilepsy. Continuous vertigo without a pattern may be due to severe anemia, posterior fossa tumor or eye muscle imbalance.

Dramamine® has been found invaluable in many of these conditions. In mild or moderate vertigo it often allows the patient to remain ambulatory. A most satisfactory treatment regimen for severe "dizziness" is bedrest, mild sedation and the regular administration of Dramamine.

Dramamine is also a standard for the management of motion sickness, is useful for relief of nausea and vomiting of radiation sickness, eye surgery and fenestration procedures.

Dramamine (brand of dimenhydrinate) is supplied in tablets (50 mg.) and liquid (12.5 mg. in each 4 cc.). G. D. Searle & Co., Research in the Service of Medicine.

1. Swartout, R., III, and Gunther, K.: "Dizziness:" Vertigo and Syncope, GP *8*:35 (Nov.) 1953.

2. DeWeese, D. D.: Symposium: Medical Management of Dizziness: The Importance of Accurate Diagnosis, Tr. Am. Acad. Ophth. *58*:694 (Sept.-Oct.) 1954.

SEARLE

## AMA DELEGATES' REPORT

*continued from page 388*

" 'The privileges of each member of the medical staff shall be determined on the basis of professional qualifications and demonstrated ability.

" 'Personnel of each service or department shall be qualified by training and demonstrated competence, and shall be granted privileges commensurate with their individual abilities.' "

* * *

Another major action by the House involved the problem of private practice by medical school faculty members, which has been under study by the Committee on Medical and Related Facilities of the Council on Medical Service. The House adopted a Council report which stated "that it shall be the policy of the American Medical Association that funds received from the private practice of medicine by salaried members of the clinical faculty of the medical school or hospital should not accrue to the general budget of the institution and that the initial disposition of fees for medical service from paying patients should be under the direct control of the doctor or doctors rendering the service."

It was further recommended that adequate liaison be developed and maintained between each county medical society and any medical school or schools in its area; that the Council on Medical Education and Hospitals and the Association of American Medical Colleges urge all medical schools to assist and work with medical societies in developing such liaison, and that publicity emanating from a medical school should be in good taste and of a type which has the approval of the general medical community in that area.

The adopted report also said: "It is not in the public or professional interest for a third party to derive a profit from payment received for medical services, nor is it in the public or professional interest for a third party to intervene in the physician-patient relationship."

### *Graduates of Foreign Medical Schools*

The House of Delegates approved in principle a program for the evaluation of graduates of foreign medical schools seeking hospital positions in the United States. The proposed program was developed by the Cooperating Committee on Graduates of Foreign Medical Schools, representing the A.M.A. Council on Medical Education and Hospitals, American Hospital Association, Association of American Medical Colleges and Federation of State Medical Boards of the United States.

The following principles were emphasized by the Council on Medical Education and Hospitals in its report recommending A.M.A. participation in the program:

"1. Although the responsibility to share educational opportunities in medicine is recognized, the primary concern must be for the health care of the American public. Thus, before assuming responsibility for the care of patients as interns or residents, all graduates of foreign medical schools (immigrants, exchange students and American graduates of foreign medical schools) should give evidence, as nearly as can be measured, of having reached a level of educational attainment comparable to that of students in American schools at the time of graduation.

"2. The primary objective of this Committee is to devise an effective mechanism for measuring educational attainment in the absence of intimate and continuing knowledge of the educational background of foreign-trained physicians. This mechanism should provide hospitals with pertinent information regarding the medical qualifications of foreign-trained physicians seeking positions as interns or residents. It should not interfere with the hospital's privilege of making its own selection among qualified physicians, nor should it serve as a substitute for or interfere with the normal licensure procedures of the various state boards.

"3. It is not intended that this mechanism be applicable to those foreign medical school graduates in this country as temporary students participating in programs of medical and related studies in recognized universities, medical schools and post-graduate schools, who by the very nature of their study are not involved in the responsibility of patient care."

The proposed plan calls for establishment of a central administrative organization to evaluate the medical credentials of foreign-trained physicians desiring to serve as interns or residents in American hospitals. Basic requirements would include satisfactory evidence of at least 18 years of total formal education, including a minimum of 32 months in medicine exclusive of any time which in this coun-

*continued on page 392*

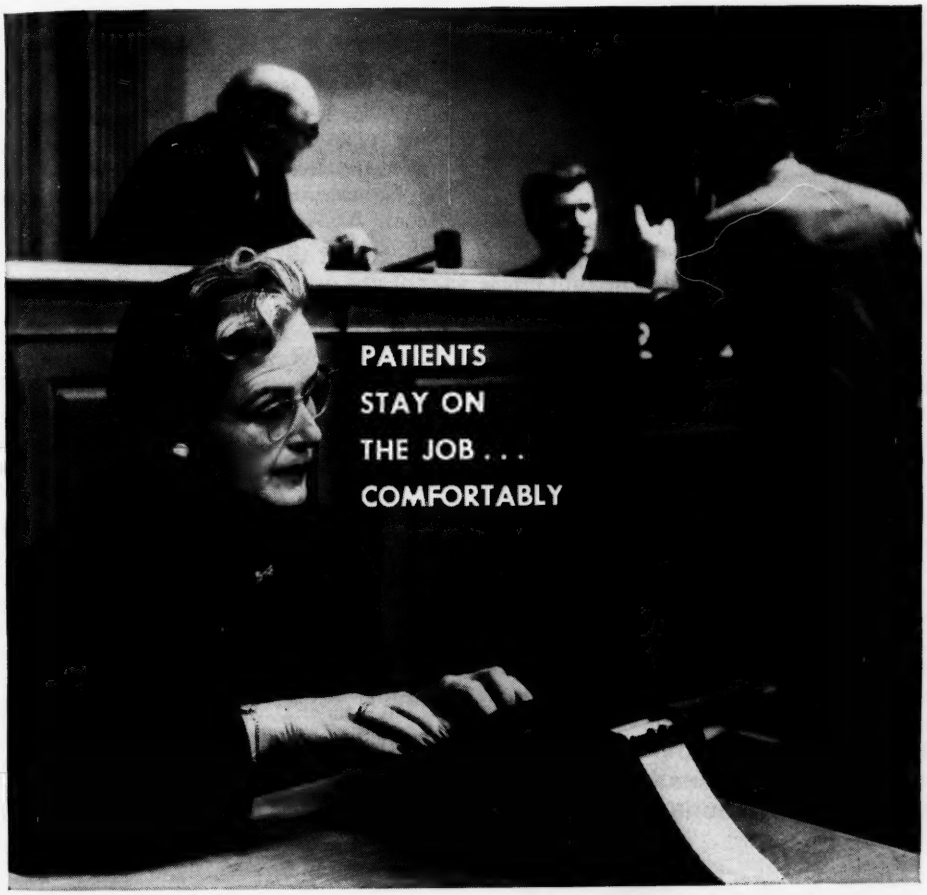
## AUXILIARY DINNER-DANCE

**The Fourth Annual Dinner-Dance of the Woman's Auxiliary to the Rhode Island Medical Society will be held on Saturday, October 6, 1956, at the Sheraton-Biltmore Hotel. Starting time is set for 8 P.M., and dress is optional.**

**The committee chairmen named for this annual social event are the following:**

*General Chairman:* MRS. STANLEY D. SIMONS
*Co-Chairman:* MRS. LOUIS E. HANNA
*Reservations:* MRS. ANGELO ARCHETTO
*Tickets:* MRS. MARK A. YESSIAN
*Decorations:* MRS. HENRY MILLER
*Posters:* MRS. GARY PAPARO

**Hostesses representing each of the cooperating hospitals are to be appointed at a later date, and tickets will be mailed to all members of the auxiliary two weeks in advance of the dance.**

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## AMA DELEGATES' REPORT

*continued from page 390*

try would be considered as premedical study or internship. Applicants with satisfactory credentials then would take a screening examination to determine their medical knowledge and their facility with the English language. Successful applicants then would be certified to hospitals and other interested organizations, with the approval of the foreign-trained physician concerned.

### *Federal Aid to Medical Schools*

One of the most controversial subjects of debate on the floor of the House was a resolution expressing strong opposition to S. 1323, a bill in Congress providing for one-time, matching grants to medical schools for construction purposes. The Association in recent years has been supporting such legislation in principle, with certain reservations concerning details of some provisions. The House reaffirmed that policy by approving a reference committee statement which said:

"We appreciate the intent with which this resolution was introduced, but at the same time we feel that there are many economic and geographical factors involved, which might not make this resolution practical on a national level. Inasmuch as no evidence was offered to this Committee to justify a change in the previously declared policy of the House of Delegates, your Committee recommends that this resolution be not adopted."

### *Drug Publicity*

The House adopted a substitute resolution on premature drug publicity which read:

"WHEREAS, In recent years, events have indicated the necessity for a closer liaison between the pharmaceutical manufacturer and the American Medical Association; and

"WHEREAS, In view of the tremendous number of new drugs being developed and the expanding research programs in medical colleges, clinics and hospitals being financed by the drug industry, it is imperative that the manufacturer and the medical profession develop cooperatively guiding principles which will protect the American people from being subjected to the premature release of information pertaining to new products or techniques; and

"WHEREAS, Competition within the pharmaceutical industry has become extremely keen so that in the advertising of their products drug manufacturing firms have been forced into the expenditure of larger and larger sums of money and in increasingly broader fields of advertising; therefore be it

"RESOLVED, That the Board of Trustees of the American Medical Association appoint a liaison committee to meet with representatives of the pharmaceutical manufacturers to accomplish this objective."

Among many miscellaneous actions on a wide variety of subjects, the House also:

Approved a Board of Trustees statement on Social Security which included the following: "It is imperative that we distinguish clearly between this problem of coverage of physicians and the far more dangerous disability proposal. The fact should be recognized that the shape of medical practice in the future is not directly related to the inclusion or exclusion of physicians under OASI. It is a matter of vital importance to us as individuals, but it cannot, per se, stimulate further government intrusion into medical care. On the other hand, the disability amendment obviously brings the Social Security Administration closer to the regulation of medical care than ever before."

Adopted a resolution amending the Bylaws to provide that the vice president, treasurer, speaker and vice speaker of the House of Delegates shall be *ex officio* members of the board of trustees with all the rights and duties of the board without the right to vote.

Increased membership of the Council on Medical Service from six to nine active or service members

and eliminated all ex officio members except the immediate past president.

Directed the Council on Medical Service and the Council on Industrial Health to reconsider the "Guiding Principles for Evaluating Management and Union Health Centers" through their joint Committee on Medical Care for Industrial Workers and to so revise the guides that they conform completely with the Principles of Medical Ethics.

Authorized the Committee on Federal Medical Services to make a continuing study of all aspects of VA medical activities under the basic policy established in June, 1953, and suggested reconsideration of the temporary exceptions made at that time with respect to neuropsychiatric and tuberculous disorders.

Recommended that the board of trustees select New York City as the place of the 1961 annual meeting.

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*Check the Date*

**SATURDAY, OCTOBER 6, 1956**

**4th**
**ANNUAL DINNER DANCE**
**of the**
**WOMAN'S AUXILIARY**
**to the**
**Rhode Island Medical Society**
**At the Sheraton-Biltmore**
**8 p.m. . . . Dress Optional**

## THE RADIOIRON TURNOVER TEST IN CLINICAL MEDICINE

*continued from page 376*

*Chronic Blood loss anemia:* If the bleeding is not excessive and iron intake is adequate, blood loss anemia will present an uncomplicated pattern. In general, however, if chronic blood loss is of sufficient magnitude to cause anemia, iron deficiency will usually have been produced by the time the patient is first seen. When iron deficiency is not a factor, the supplies of all red cell precursors will be adequate, marrow function will be increased maximally in response to the anemia, but the functional red cell life span will be reduced as a result of the actual loss of cells. For the first three days of the test the data will thus be similar to that encountered in hemolytic disease; that is, very rapid clearance, somewhat reduced iron concentration, and close to complete reappearance of the cleared iron in red cells within 3-4 days. From here the patterns will vary. In hemolytic anemia the cells, even though of shortened life span, will remain in the circulation maintaining a constant level of circulating radioactivity. Even with cell destruction, the iron will be promptly reutilized, so that the blood radioactivity will be reasonably constant over many red cell life spans. Decrease in activity (other than that due to radioactive decay) will take place slowly due to partial storage and excretion losses, with each reutilization. With blood loss however, the whole blood radioactivity will start to drop immediately because of the loss from the body of red cells of all ages. When uncomplicated, this loss will follow an exponential curve, a given percentage of all red cells being lost per day, irrespective of cell age. The rate of loss can be estimated initially from the effective red cell life span calculated from data obtained during the first three days, then subsequently confirmed from the observed rate of loss of whole blood radioactivity.

When iron deficiency has become superimposed, the pattern will be essentially the same except that the anemia is likely to be more severe, plasma iron concentration will approach zero and the T/2 will approach 15 minutes. The proof of blood loss will still rest upon the whole blood radioactivity curve over a period of weeks.

*Polycythemia:* This condition, whether primary or secondary, represents over-production of red cells in the face of already excessive hemoglobin. Iron stores are adequate and red cell life span may be somewhat shortened. Because of the overactivity of the hematopoietic system, the rate of plasma iron clearance is increased, T/2's of 20-30 minutes being encountered frequently. Because of the rapid clearance rate, plasma iron concentration tends to be slightly low although normal or elevated concentrations have been observed. The red cell uptake of the cleared iron reaches approximately 100% in 3-5 days.

*Pernicious anemia and Mediterranean anemia:* An unusual and, at this time, unexplained combination of iron turnover constants is noted in untreated pernicious anemia and in Mediterranean anemia. This combination — rapid plasma clearance, high plasma iron concentration, and poor red cell uptake over a prolonged period of weeks—has been observed in all of nine patients with untreated pernicious anemia and five with thalassemia. With one exception (a patient with Gaucher's disease), this pattern has not been observed in any other condition. The failure of the large quantity of cleared plasma iron to reappear in circulating hemoglobin indicates that it is not incorporated into useful erythrocytes. Three explanations have been offered to account for this discrepancy.

1. The plasma iron is removed by the immature red cell precursors, but because of "maturation arrest" is not released in circulating red cells. If this were the case, the iron would eventually have to be released back to the plasma, since the physical capacity of the cells in the marrow would soon be reached.

2. The cleared iron is initially released in erythrocytes, but most of these are of defective structure and are rapidly destroyed. The radioiron in circulating erythrocytes at any one time would be but a small part of that constantly being reutilized for new hemoglobin production. The gradually increasing blood radioactivity over a period of weeks is accounted for by the random incorporation of radioiron into the small percentage of adequate cells, where it is contained for more normal periods of time. The main objection to this explanation is that it requires the postulation of a tremendous degree of hemolysis, which is not confirmed by the quantities of excreted breakdown products of hemoglobin. The excretion of porphyrins is somewhat increased over normal, but not to the extent which would be required to support this theory.

3. The rapid clearance of plasma iron along with the elevated plasma iron concentration, represents

*continued on page 396*

### RHODE ISLAND HOSPITAL REUNION

**The reunion of former interns, residents and Fellows of Rhode Island Hospital is scheduled for September 28 and 29. Plans are being formulated for professional programs at the hospital on Friday morning and afternoon, and again on Saturday morning. Gormer House officers who have gained national prominence will return to participate in the program. The main social event being planned is a shore dinner at the Squantum Club for the *home-comers* and their wives.**

**To date more than five hundred acceptances have been received which indicates that the reunion will be the largest in the history of the hospital.**

## THE RADIOIRON TURNOVER TEST IN CLINICAL MEDICINE

*continued from page* 394

the rapid exchange of large quantities of iron between plasma and storage depots to the exclusion of the marrow. The steady rise in red cell radioactivity is explained by the repeated opportunities of any one iron atom to be removed by the marrow, because of the rapid and continuous equilibrium of the storage depot iron with the plasma. Some evidence to indicate that this explanation may be correct, is offered from four patients with pernicious anemia. On the basis of this explanation, and of the observed plasma iron concentrations, clearance rates, and red cell incorporation curves, the quantity of storage iron was estimated. Complete utilization of this iron would have raised the circulating hemoglobin levels of these four patients to respectively 11, 13, 18, and 21 gm.%. Following vitamin $B_{12}$ therapy, the first two did become iron deficient at approximately the predicted hemoglobin levels, while the other two were not iron deficient when the hemoglobin concentrations stabilized at about 15-16 gm %. The labile iron storage explanation gives no indication of the origin of or mechanism for such rapid exchange, and also leaves other points unexplained, but on the basis of the available evidence is favored by the author at this time.

*Anemias associated with cancer, infections, arthritis:* In almost all of the anemias in this group that we have studied, a hemolytic pattern has been observed, with calculated red cell life spans approximately half of normal. Anemia associated with generalized neoplastic disease is often ascribed to decreased red cell production because of physical replacement of marrow elements by tumor. A hypoplastic pattern was observed in only three of over 200 anemic cancer patients in our experience. Probably, enlargement of the erythropoietic tissues to include peripheral marrow spaces, and extramedullary hematopoiesis, are able to compensate for a relatively slow and steady loss of normal marrow space. The explanation for the hemolytic pattern associated with these disease conditions is not indicated by radioiron studies.

*Hemochromatosis:* This disease apparently is caused by a defect in the mechanism controlling the absorption of iron from the intestine, and is not associated with any particular hematopoietic disorder. Iron is constantly absorbed, uninhibited by the high plasma iron concentration and excessive storage iron. Since the body has no mechanism for eliminating excess iron, the absorbed iron in turn must be stored. The plasma iron concentration is high, the clearance rate is normal, and per cent uptake is reduced. Total hemoglobin production and red cell life span are normal.[20]

*Combined conditions in the production of anemia:* Not infrequently, several deficiencies or defects will simultaneously contribute to an observed anemia. The interpretation of the iron turnover data will often be semi-empirical in such cases. For example, the normal half-time is stated to be 1-2 hours. With an impending iron deficient state, even though the hemoglobin concentration, marrow function, and red cell life span are all normal, the plasma iron concentration will be low, and clearance rapid. Similarly, with anemia caused by hemolysis or bleeding, it is to be expected that the T/2 will be short if the marrow is capable of responding adequately to the stimulus provided by the low hemoglobin. The half-time will also be dependent upon the status of the iron stores and the duration of the anemia as well as upon its severity. With a hemoglobin of 6-7 gm. % and normal or low plasma iron concentration, a T/2 of 1½ hours would not be normal, even though this lies within the stated normal range. This would be interpreted as a hypoplastic response to an anemia of other primary etiology.

In our series, patients with the following combinations have been observed:

One with Mediterranean anemia and iron deficiency.

One with hypothyroidism, hypoplastic anemia, and iron deficiency.

Three with hemolytic anemia and hypoplasia.

TABLE I

| Hematological Condition | Fep-c | T/2 | *Uptake* |
|---|---|---|---|
| | ug % | Hours | % |
| *Normal* | 60-110 | 1-2 | Up to 90% in 1 week. Then plateau. |
| *Anemia* | | | |
| Iron deficiency | 0-50 | 0.3-0.5 | Approaching 100% in 3-4 days. Then plateau. |
| Chronic blood loss | 0-50 | 0.3-0.5 | Approaching 100% in 3-4 days. Then steady fall off. |
| Hemolytic | 40-70 (Occ. high) | 0.3-0.5 | Approaching 100% in 3-4 days. Then plateau. |
| Chronic infections<br>Malignant tumors<br>Leukemias<br>Liver diseases | 40-70 | 0.3-1 | Approaching 100% in 3-4 days. Then plateau. |
| Aplastic | 150-300 | 2-6 | Very low and slowly rising. |
| Addisonian | | | |
| untreated | 150-200 | 0.3-0.6 | Slow rise over many weeks, no plateau. |
| remission | | | |
| early | 40-70 | 0.3-0.4 | Approaching normal. |
| late | 60-110 | 1-2 | |
| Mediterranean | 150-200 | 0.3-0.6 | Slow rise over many weeks, no plateau. |
| *Polycythemia* | | | |
| Primary, untreated | 50-100 (Occ. high) | 0.3-0.5 | Approaching 100%. |
| remission | 60-110 | 1-2 | Normal. |
| repeated phlebotomy | 40-70 | 0.3-0.5 | Approaching 100%. |
| Secondary | 50-100 (Occ. high) | 0.3-0.5 | Approaching 100%. |
| *Hemochromatosis* | 200-250 | 1-2 | Low uptake. |

Two with hemolytic anemia (one sickle cell) and iron deficiency.

Five with neoplastic disease with hemolytic anemia and iron deficiency.

One with anemia of pregnancy (megaloblastic), hemolytic disease, and excessive plasma iron concentration following large oral intake of ferrous gluconate.

One with polycythemia and iron deficiency.

In Table I are presented the types of anemia which we have studied, along with the radioiron turnover data observed.

## Part III

### *Clinical Application of Radioiron Tracer Studies*

1. *Diagnostic:* Many hematopoietic disorders will be diagnosed as to type and etiology quite readily from the history and physical examination of the patient, the Wintrobe constants, and the stained blood smear. The over-all severity of the disease will be evident from the hemoglobin level. Radioiron studies would then be primarily of academic interest, and financially impractical. There are always some patients whose condition defies diagnosis. Radioiron studies will usually indicate the type and severity of the physiological defect; that is, a hemolytic process with an average red cell life span of forty days may be indicated, even though the cause for the hemolysis will not. The severity of a given pathological process is often not appreciated with routine tests. For example, in hemolytic disease, a hemoglobin of 10 gm. % does not mean an abnormality with a quantitative ratio of $\frac{10\ \text{gm}\%}{15\ \text{gm}\%}$. More likely, in response to the anemia, hemoglobin production is several times normal, but the hemolytic process is sufficiently severe that even with the increased production a normal level cannot be maintained. Or a normal hemoglobin may be maintained despite the loss of 1% of the total blood volume per day, as a result of twice the normal hemoglobin production. The hemoglobin level would give no indication of the severity of the bleeding.

Combined hematopoietic disorders are likely to give a confused picture with routine diagnostic tests. The iron turnover patterns may also be confusing under these circumstances, but we have had several cases where the correct combination was diagnosed. The quantitative determination of the daily hemoglobin production offers a useful starting point. The half-time and the plasma iron concentration[50, 51, 54, 55] individually often gives an indication of the status of the marrow and of the storage depots.

Additional tests may be performed to further aid in the diagnosis of specific conditions. For ex-

*continued on next page*

ample, in iron deficiency anemia, the basic cause may be one of three:

1. Diet, inadequate in iron or containing chelating substances which bind iron.
2. Inability of the intestinal mucosa to absorb iron.
3. Chronic blood loss.

Possibility 3 is best established by determining the whole blood radioactivity level for some time following a routine turnover test. Possibility 2 can be checked by administering a tracer dose of radioiron sulphate with 5 mg. of therapeutic ferrous sulphate in the early morning, no food having been ingested since a light supper at six the evening before, and food being withheld until noon. Failure of a portion of the administered radioiron to appear in the circulating hemoglobin within 3-5 days is almost certain evidence of inability to absorb iron. Administration of an intravenous iron preparation is the treatment indicated, which may also give additional confirmation of the defect involved. We have encountered one such patient.

Another refinement described by Lawrence et al is designed to differentiate polycythemia secondary to correctable oxygen deficiency from polycythemia vera and uncorrectable decreased oxygenation. An initial half-time is obtained, which is most likely to be rapid. The patient is then placed in an oxygen tent for twenty-four hours. If the polycythemia is secondary to decreased tissue oxygenation as a result of inadequate oxygen transfer across the pulmonary barrier, the oxygen concentration of the blood while in the tent is likely to become normal or excessive. As a result, the stimulus for hemoglobin production will be decreased or eliminated, and the plasma iron clearance rate will be slowed, giving a normal or a prolonged T/2. Patients with polycythemia vera will be unaffected by the rich oxygen atmosphere.

2. *Control of hematopoietic therapy:* Two main areas are to be considered—

1. The rapid and quantitative evaluation of administered anti-anemic therapy.
2. The evaluation of treatment for polycythemia by hematopoietic depressants.

The major savings which may result from the early evaluation of therapy directed toward the treatment of anemia, are the time saved for the patient, and the expense for non-effective drugs. When drugs are effective in altering the rate of hemoglobin production, the change will usually be reflected in the plasma iron clearance rate within twenty-four hours. When the drug in use is shown to be of no value, the patient may be spared the expense of long and repeated trials. The ineffectiveness would otherwise be evident only by failure of the hemoglobin level to show a rise. The conclusion that hemoglobin production is not being improved may take weeks or months to realize when the circulating level is the only criterion. Reticulocyte response may be indicative when the rise is unequivocal, but is subject to more uncertainty and less quantization. [7]

Two examples of early detection of the response to therapy are those of hypoplastic and of pernicious anemia. We have studied four patients with hypoplastic anemia who had failed to respond to routine vitamin therapy. Each had a half-time of between 3 and 5½ hours. As a final trial, each was given large oral doses of cobalt chloride. The half-times of two of these patients changed to less than one hour within twenty-four hours after the initiation of therapy, and they subsequently went on to fair clinical remissions. The other two showed no alteration of half-time at twenty-four hours, and failed to show any improvement after prolonged therapy with cobalt and other hematemic agents.

In pernicious anemia, the half-time becomes even shorter than before treatment within twenty-four hours after vitamin $B_{12}$ administration. The utilization curve changes more drastically, reaching almost 100% in 3-5 days. As treatment continues and the hemoglobin level rises, the half-time and uptake curve gradually approach normal. This will only be true if storage iron is adequate for the production of a normal quantity of hemoglobin.

In the treatment of polycythemia vera with de-

pressant therapy, the problem is more complex. The intent is not to cause the greatest possible change, as in the treatment of anemia; nor is the reticulocyte count of consistent value for evaluating change. Conservative treatment, giving known safe doses of the depressant, whether it be radiation, radiophosphorus, or nitrogen mustard, ordinarily requires a delay of several months until the hemoglobin level stabilizes between successive treatments. Vigorous treatment to reduce this time lag may result in overtreatment and permanent anemia. Determination of the radioiron half-time at appropriate intervals after each treatment allows much more rapid evaluation of the effect of treatment, and therefore less delay between treatments, until a normal hemoglobin production is attained. If single doses of total body radiation are used as the mode of therapy, a slowing of the iron turnover will be evident within twenty-four hours, reaching peak depression at 3-4 days, with some recovery evident during the following one to two weeks. It is well to aim initially at producing a half-time of about 2½ hours, since even with a normal hematopoietic system, hemoglobin production will be depressed by the high hemoglobin level; also the high plasma iron concentration which is maintained for some time by the breakdown of the excess red cells will slow the percentage rate of clearance. When all these phases have reached equilibrium, most patients will show a partial return toward a rapid turnover, and will require retreatment. The second treatment can then be given within a month with little danger of overtreatment.

When radiophosphorus is used for treatment, additional uncertainty is caused by the many weeks over which the radiation is delivered. Radioiron studies will be of little value until about a month after phosphorus administration, and stabilization of the hemoglobin concentration will be correspondingly delayed.

3. *Control of hematopoietic damage by depressant agents in the treatment of cancer:* Total body radiation, internally administered radioisotopes, and the various chemotherapeutic agents for cancer all cause hematopoietic depression. In our series of 23 patients all treated similarly with 200r skin dose total body radiation delivered from a single anterior field, the plasma iron clearance rate changed in 65% compared to 65% for the white cell elements, and 85% for platelets. Depression in the peripheral white count is rarely pronounced in less than one to two weeks following total body radiation, and the drop in platelet count usually only starts in two-three weeks, reaching a low in four to seven weeks. The advantage of the plasma clearance rate determination is that the change, when present, is noted within twenty-four hours after the radiation is given with maximal slowing at three days. Recovery of the half-time takes place gradually during the following two to three weeks. The

*continued on next page*

turnover change is temporarily quite severe, an indication that red cell formation is as radiosensitive as is white cell or platelet formation. This would ordinarily not be appreciated, since complete cessation of red cell formation for one to two weeks would not produce a marked change in the peripheral blood count, due to the normal red cell life span of about 120 days. This illustrates one of the advantages of studying the dynamic value of production, rather than the static value of concentration.

In the practice of radiotherapy, the iron turnover test has been of considerable help to us in the evaluation of impending intolerance to total body irradiation.[56, 57] For such purpose, the full iron turnover test, with red cell uptake determination, is not as practical an index as is the half-time. For the test to be used to warn of hematopoietic depression from radiation fractionated over several weeks, it is necessary that the test be repeated at periodic intervals; for example, weekly along with the routine hematology. If the plateau in the red cell uptake curve has not been reached by the time of the second test, subsequent uptake percentages will be meaningless. After several tests have been performed, further rise in red cell radioactivity becomes increasingly difficult to quantitate as a percentage of the most recently administered radioiron. On the other hand, the change in disappearance half-time alone appears to be of considerable value. The half-time is reasonably constant over a period of several weeks for any one individual. For example, 28 patients who had repeated turnovers without intervening therapy of any type, and 13 who had small field external radiation without any alteration of peripheral blood counts, showed practically no change in half-time.

Similar changes have been shown following therapy with nitrogen mustard and triethylene melamine.[58]

## SUMMARY

The physiologic background and rationale for the clinical application of radioiron tracer studies has been presented, along with detailed directions for the performance of these studies. Interpretation of the data is discussed. Over 700 turnover studies on more than 300 patients from our department have been analyzed to present a table of normal and abnormal values for the hematopoietic disorders studied.

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*concluded on page 404*

# DISTRICT MEDICAL SOCIETY MEETINGS

## WOONSOCKET DISTRICT MEDICAL SOCIETY

A meeting of the Woonsocket District Medical Society was held on June 7, 1956. The meeting was called to order at 5:00 P.M. by Doctor Francis P. Vose, president, in the auditorium of the Woonsocket Hospital. Representatives of the District Dental and Nursing Societies were guests, and regular meeting procedure was omitted in order that the members and guests might hear Mr. George Rodericks, Medical Coordinator of the Rhode Island Council of Defense, discuss Emergency Medical Care.

On a nation-wide basis, he reported, enough medical supplies are now stored to treat five million casualties. For the most part, these supplies take the form of complete two hundred bed packaged hospitals, which are equipped with their own X-ray machines, electric generators, operating rooms, etc.

For Rhode Island, present plans call for six complete hospital units to be shipped here in the near future, to be stored at strategic parts of the state, and to be held in a state of immediate readiness in case of atomic attack or any other great disaster. One such casualty hospital is now present in Rhode Island and will be used for training purposes.

In addition, between three and four hundred radiologic instruments, such as Geiger counters, have been received by Civilian Defense in Rhode Island. A training program is to be launched in the near future in each community in order that each may have trained personnel in the event of attack.

The most urgent need at present is for the training of people to set up and run the emergency hospital units. All local medical, dental and nursing associations are about to be contacted so that they may send representatives to the first practice session of setting up and running this casualty hospital unit. The first such drill is to be held in July.

President Francis P. Vose thanked the speaker for coming to Woonsocket to inform the professions on civil defense, and he pledged the cooperation of the Woonsocket District Medical Society.

The meeting was adjourned at 10:15 P.M.

Respectfully submitted,

ALTON P. THOMAS, M.D., *Secretary*

## PAWTUCKET MEDICAL ASSOCIATION

A dinner meeting of the Pawtucket Medical Society was held at the Lindsey Tavern at 6:30 p.m. on May 17, 1956. Doctor Raymond T. Stevens presided.

The following members were present: Doctors Billings, Stevens, Lussier, Webster, Woodcome, Kelly, Edward Foster, Gorfine, Zolmian, Lappin, Chapman, Sprague, Forgiel, Rudolph Jaworski, Alexander Jaworski, Riemer, Hecker, Stapans, Jeremiah, Schiff, Ruggles and Sonkin.

The minutes for the previous meeting were read and approved.

Communications were read and included the following:

1. Application of John Joseph Cunningham, M.D., for membership admission;
2. Request for application for admission from Alton M. Paull, M.D.;
3. Resignation from associate membership by Hannibal Hamlin, M.D.;
4. General information in regard to the Benevolence Fund of the Rhode Island Medical Society.

Following dinner Doctor Edward Radlo of the Pawtucket Dental Society spoke on the topic "The Present Status of Fluoridation of Water." A brief summary of his remarks is as follows:

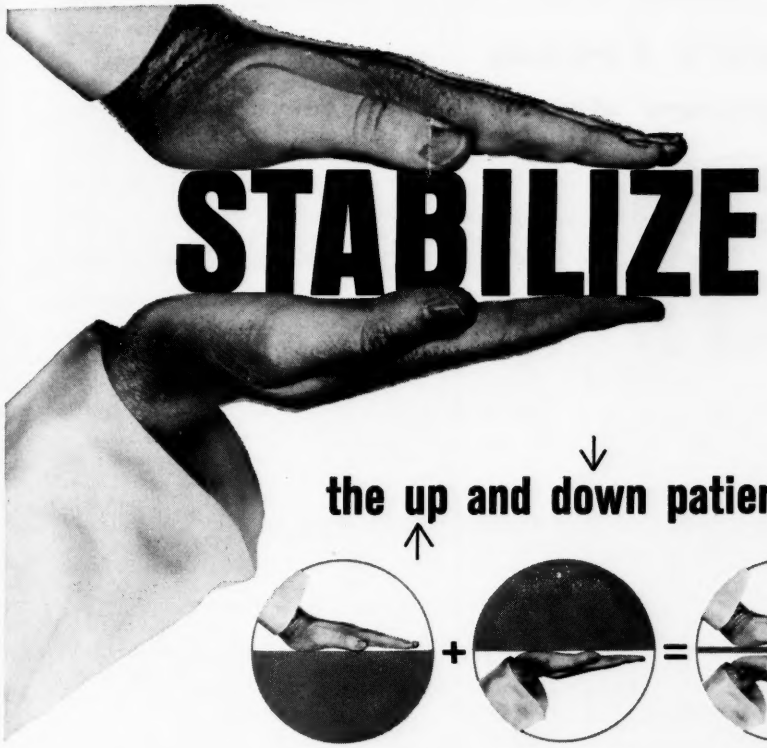
Scientific studies have shown that water fluoridation has decreased dental caries in pre-school children. A solution of one part of sodium fluoride to one million parts of water is considered a safe range. Fluoridation is safe at such levels and there are no detrimental effects to the musculoskeletal system as a whole. There are many individuals and groups who are anti-fluoridationists; however, this is due to misconceptions, superstition and ignorance.

Some general discussion followed which concerned the recent polio advertisement by the Society in the PAWTUCKET TIMES.

A report of the Committee on Fee Revision was deferred until the next meeting as there had been only an approximate 20% return on the questionnaire submitted by mail to the members.

Doctor Kelly made a motion that a poll of the members should be conducted by mail asking if fees should be raised; the answer was to be "yes" or "no." Doctor Rudolph Jaworski seconded the

*concluded on page 404*




## the up and down patient



**Serpasil**
*tranquilizer*

**Ritalin**
*psychomotor stimulant*

**Serpatilin**
*emotional stabilizer*

To induce emotional equilibrium in those who swing from anxiety to depression, Serpatilin combines the relaxing, tranquilizing action of Serpasil with the mild mood-lifting effect of the new cortical stimulant, Ritalin. In recent months, numerous clinical studies have indicated the value of combining these agents for the treatment of various disorders marked by tension, nervousness, anxiety, apathy, irritability and depression. Arnoff,[1] in a study of 51 patients, found the combination of definite value in a variety of complaints, noting no effect on blood pressure or heart rate. Lazarte and Petersen[2] also found Serpatilin effective in counteracting the side effects of reserpine and chlorpromazine. They reported: "The stimulating effect of Ritalin seemed complementary to the action of reserpine . . . in that it brought forth a better quality of increased psychomotor activity."

1. Arnoff, B.: Personal communication. 2. Lazarte, J. A., and Petersen, M. C.: Personal communication.

*Serpatilin Tablets*, 0.1 mg./10 mg., each containing 0.1 mg. Serpasil® (reserpine CIBA) and 10 mg. Ritalin® hydrochloride (methyl-phenidylacetate hydrochloride CIBA).

*Dosage:* 1 tablet b.i.d. or t.i.d., adjusted to the individual.

# Serpatilin T.M.

**(reserpine and methyl-phenidylacetate hydrochloride CIBA)**

CIBA
SUMMIT, N. J.

2/2289M

## PAWTUCKET MEDICAL ASSOCIATION

*concluded from page 402*

motion and it was passed unanimously.

Doctor Chapman made a motion that the Fee Revision Committee bring back a recommended fee schedule at the next meeting. This was seconded by Doctor Ruggles and passed.

A great deal of general discussion followed in regard to fee revision. No conclusions were reached.

The meeting adjourned at 10:35 p.m.

Respectfully submitted:

NATHAN SONKIN, M.D., *Secretary*

## THE RADIOIRON TURNOVER TEST IN CLINICAL MEDICINE

*concluded from page 400*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## THE CHALLENGE OF SCIENCE

*concluded from page 379*

isn't easily broken, takes a wonderful polish, and passes no visible light. It will save a great deal of time if used in a telescope, because it won't be worth while to look through the telescope!"

Another one I was discussing with my students this afternoon—Murphy's laws. Do you know them? Are they well known to doctors? Here is the first one: If a thing can go wrong, it will. Law No. 2: Things left to themselves will in general go from bad to worse. Law No. 3: In general, if nature can provide a situation in which your theory won't hold, it will.

If you ask a student right out of the blue sky, "Do you suppose it is possible that the second law of thermodynamics might not be true in all cases?" If he looks horrified and shocked that you even would suggest such a thing, then he is old before his time. It ought to be the students who are asking the professors, "How do you know the second law of thermodynamics always works; might there not be some cases where it wouldn't?" After all, if we had a law of conservation of energy and a law of conservation of mass and we now have only one law, the law of conservation of energy and mass, maybe other laws could be wrong, too.

I would like to see us turning out students with enough of a question mark in their minds, and enough of a bit of imagination left, so that they can sit down and talk about things and reach out for ideas that we haven't had.

Once more, what is reasonable to hope for? I wonder if you know where the professions stand in the mind of youth today? Someone recently took two thousand adults and one thousand young men, and asked them to rate the different professions in order of their ideas of which stood highest.

If you haven't seen this, you may be interested to know that at the top of the list was the physician and surgeon, the doctor. Second in line, for both the adults and the young men, was the scientist. The college professor was third for the adults, and fourth in the list of young men.

I am not going to bore you with the whole list, but I will just tell you that the public school teacher was numbered sixth in the adult list and eighth in the young men's list. Even the disk jockey was above the public school teacher.

Have I made my point? I think that it is important. Not so important that we pay these people more money, but that we give them more credit for what they have been doing. Many of them are devoted people, giving everything they have. Some of them would be teachers even if you didn't pay them anything. I think they deserve a great deal of credit.

I am speaking now for the secondary school teacher in science, and I do hope somehow we will fix it up so it will work well.

I shall be interested in watching, and I hope you will, in the next five years, let us say, to what extent will we take care of these difficulties with mathematics, electronics, and imagination.



## RECENT ADVANCES IN PLASTIC SURGERY

*concluded from page 382*


Plastic Surgery. Surgical Clinics of North America—October, 1947

[3]Sumner Koch, Chicago: History of Plastic Surgery. Plastic and Reconstructive Surgery 6:97:50

[4]E. C. Padgett, Kansas City: Plastic and Reconstructive Surgery. Textbook

## MEDICAL CARE FOR AWOL SOLDIERS

Headquarters First Army

Governors Island, New York 4, New York

Office of the Surgeon

18 June 1956

Dear Sirs:

In a number of cases physicians and hospitals have accepted for emergency treatment members of the U.S. Army who were in an Absent Without Official Leave (AWOL) status. Upon subsequent submission of vouchers for payment, the physician or hospital has had to be informed that current regulations preclude the payment from public funds for medical treatment rendered military personnel in an AWOL status.

In an effort to inform interested persons of the means whereby payment may be authorized for emergency treatment of an individual who is first seen in an AWOL status, it is believed that your association might wish to publicize the proper procedure through your state journal.

Upon the acceptance by a hospital or physician of an individual in the military service (Army, Navy or Air Force), immediate report should be made to the nearest military facility of the illness or injury. This procedure should be accomplished whether the individual is absent with or without official leave in order that his parent organization may be informed of his continued absence by reason of illness or injury. If the individual is in an AWOL status, the report of his location and illness or injury constitutes a return to military control and in effect terminates his AWOL status. The government subsequently becomes responsible for payment of his medical care by civilian agencies. These statements apply to practically every situation except those unusual cases in which an individual is engaged in a criminal act or when unauthorized medical care is furnished for a condition that is not an emergency. Also, the assumption must be made that one service will act for the other in the matter of relaying the information to the parent organization.

Statements of account for payment may be forwarded to the individual's commanding officer who will transmit them to their proper destination. The processing of an account involves a matter of weeks but payment is certain when emergency medical care is rendered a bona fide member of the military service who is not AWOL and who is not engaged in a criminal act.

If further inquiry is desired, you are invited to address correspondence to Surgeon, First Army, Governors Island, New York.

Very truly yours,
H. W. GLATTLY
*Brigadier General, MC*
*Surgeon*

# BOOK REVIEWS

*THE NEUROSES IN CLINICAL PRACTICE* by Henry P. Laughlin, M.D. W. B. Saunders Co., Phil., 1956. $12.50

This book deals with diagnosis, symptoms, psychodynamics and treatment of neuroses. There are 216 illustrative case histories. A brief historical background of different entities is presented in the beginning of each chapter. One part of the book deals with the study of psychodynamics in general.

I found especially useful the chapters on *Anxiety States* and *Obsessive Compulsive Reactions,* with discussion of epi- and endogain in specific cases. The chapter dealing with the intricacies of differential diagnosis in *Neuroses Following a Trauma* also seems to me of considerable practical value, particularly in cases of *Accident Compensation.* We know that chemotherapy has its limitations, yet, I feel that the author stresses too little its supportive effect.

This volume contains also a *Brief Outline Classification of Emotional and Mental Illness* and a *Glossary of Psychiatric Concepts and Terms.* Concise summaries at the end of each chapter make this work useful for quick reference.

This book is written primarily for psychiatrists yet it may be helpful to the general practitioner with its indication *when* to refer a patient to a psychiatrist.

The entire subject is dealt with vividly and competently. It is based on numerous references to writings of authorities in the field.

CATHERINE ZOURABOFF, M.D.

*VADY A CHOROBY VLASU (TRICHOLOGIE)* by Vlasta Ríhová. Praha, 1951 (in Czechoslovakian)

The author, professor at the Karl's University in Prague, shows she is well versed in diseases of the hair. In this second edition the book, of 235 pages, is well printed on good glossy paper and has 98 well- chosen illustrations. The references, although the book is mainly intended for the Czechoslovakian general practitioner, are well selected and extensive. A trichology glossary is appended. Few will be able to read it in this country. However, the frequent Latin, Greek, German and French synonyms give good hints to those unfamiliar with the language. The author is to be congratulated for a valuable piece of work.

F. RONCHESE, M.D.

*DERMATOLOGIA GERIATRICA* by Marcial I. Quiroga and Carlos F. Guillot. S. A. Roche, Buenos Aires, 1955 (In Spanish).

François Villon verses introduce this interesting 52-page monograph: "When I look at myself naked in the mirror and see myself so changed, so dry. . . . What has happened to my blond hair. . . ." Senile changes of sebaceous glands, keratinization, melanic pigment, atrophies, dystrophies, vascular disorders and the hair are discussed. Chapters on hygiene and prophylaxis follow.

F. RONCHESE, M.D.

*THE TRUTH ABOUT CANCER* by Charles S. Cameron, M.D. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1956. $4.95

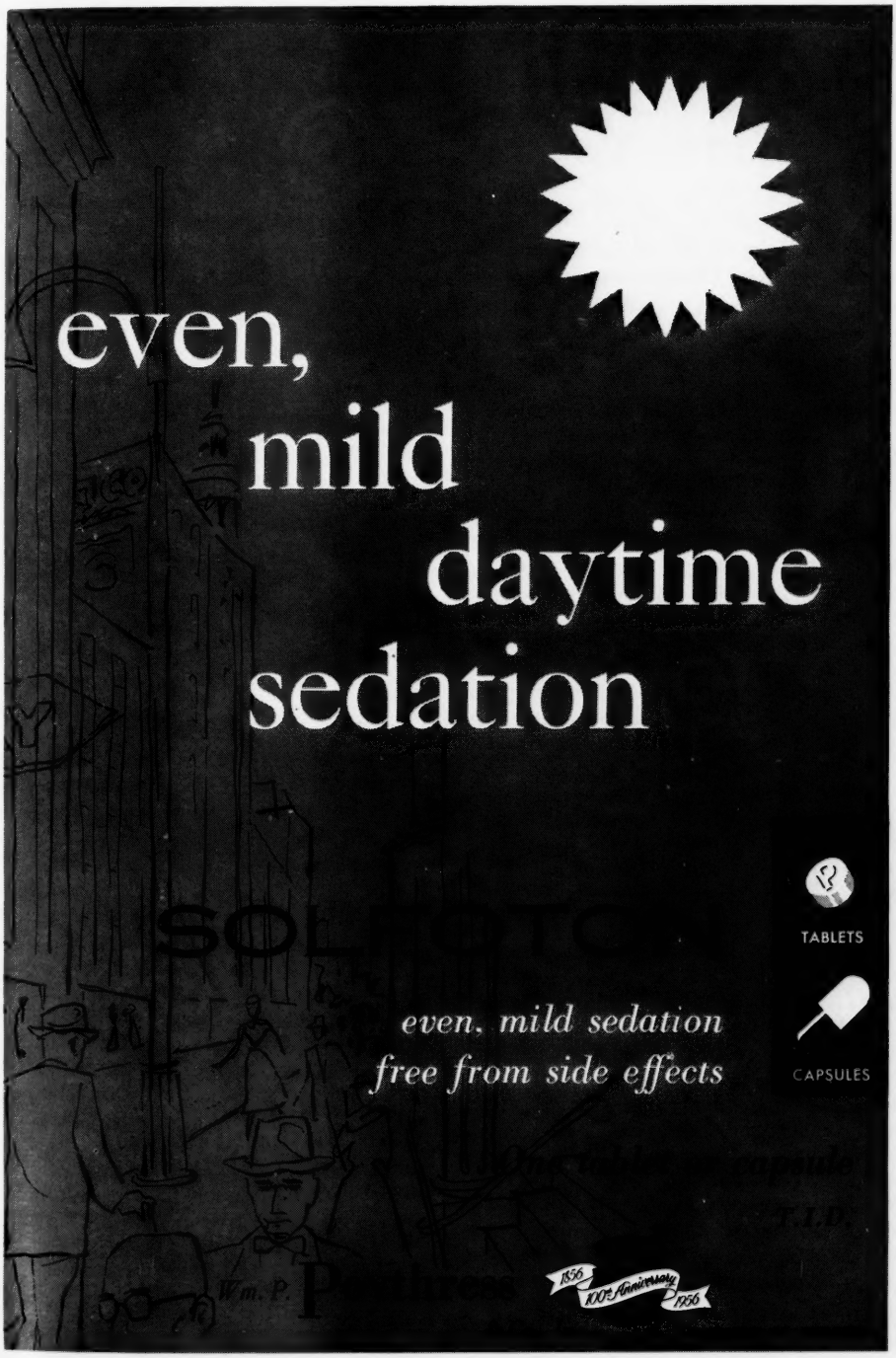
On the 257th and last page of his book, Dr. Cameron points out that the cancer death rate for surgeons is only two-thirds of the rate for other people. "Everyone can't be a surgeon, of course. But only when everyone recognizes and accepts the importance of personal responsibility will the control of cancer become a living reality instead of the mere prospect it now is." With these words the author closes an interesting book that explains cancer and what can be done about it to the lay reader.

With increased public attention focused on cancer such a book was inevitable. Dr. Cameron, whose speeches remind one of Winston Churchill, has a bit of the Churchillian style as he writes about cancer. This is particularly apparent as he launches his verbal attack against quacks in the 8th Chapter. There he divides them into three categories and exposes them for what they are. "Which will you have," Dr. Cameron asks the reader, "a witch's brew dreamed up by a man who never finished grammar school? Or the best of modern medical science offered by doctors of medicine whose judgment and skill are patiently forged through years of intensive, disciplined study?"

Dr. Cameron presents authoritative information in this pleasing style that does not make for quick, easy reading but is well suited for the thoughtful reading that is appropriate to the subject matter.

Part Two of the book has chapters on cancer of various sites allowing the reader to select those of interest to himself and omit others if he chooses. This feature plus the generous use of diagrams, charts and photographs adds to its value as a source

*concluded on page 410*


even,
mild
daytime
sedation
TABLETS
CAPSULES
even, mild sedation
free from side effects
1856
100th Anniversary
1956

## BOOK REVIEWS

*concluded from page 408*

for the lay reader seeking information about cancer.

As might be expected, Dr. Cameron stresses the importance of early recognition of symptoms which might mean cancer.

ROBERT F. MURPHY, *Executive Director*
*Rhode Island Cancer Society*

*CLINICAL RECOGNITION AND MANAGEMENT OF DISTURBANCES OF BODY FLUIDS* by John H. Bland, M.D. 2nd ed., W. B. Saunders Co., Philadelphia, 1956. $11.50

The second edition of this well-known book has been renamed, rewritten, brought up to date and considerably improved in content and expression. It is a comprehensive treatise on all phases of fluid and electrolyte management with special emphasis on the clinical symptoms and signs available at the bedside. While he does not deprecate laboratory data, Doctor Bland feels that the line of approach should be in the order of observation, speculation, hypothesis and finally experimental data to judge the hypothesis. To quote: "In our frenzy for numerical precision, I have the belief that we have left many useful bedside observations in the dust, observations that, if made and interpreted, in many instances may constitute a more reliable guide in diagnosis and therapy than the most extensive accumulation of laboratory data. It seems that the present-day medical student, interns, residents and many of their teachers are over fascinated with the rituals of science involving complicated glassware, flame photometers, Geiger counters, isotopes, techniques and laboratory procedures; the far less spectacular but certainly fruitful results of careful observation are left for only a few."

The author presents in thoughtful and scholarly fashion a wealth of documented factual material and concepts starting with basic physiologic considerations of water, electrolyte and hydrogen ion control, followed by chapters on pathological deviations in congestive failure; liver, pulmonary and renal disease; diabetes, and adrenal cortical insufficiency. There are also chapters devoted to the pediatric, geriatric and surgical patient, fluid and electrolyte derangements in central nervous system disease, shock, burns, crush and blast injuries, irradiation, and a special chapter on potassium and magnesium metabolism.

Constant emphasis is placed on the integration of clinical observations, physiologic considerations and laboratory data. Much of the discussion is summarized in the form of tables and figures which add greatly to the clarity of presentation. The book is well written and in places even entertainingly so. At the same time, it should be assimilated slowly; if attempted as a single capsule it could lead to temporary indigestion. It is highly recommended as a thorough and practical text on the entire subject of fluid and electrolytes.

WENDELL T. CARAWAY, PH.D.

## U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

**Food and Drug Administration**
**Washington 25, D. C.**

***Public Warning***
***Against Hoxsey Cancer Treatment***

Sufferers from cancer, their families, physicians, and all concerned with the care of cancer patients are hereby advised and warned that the so-called Hoxsey treatment for internal cancer has been found by the United States Court of Appeals for the Fifth Circuit, on the basis of evidence presented by the Food and Drug Administration, to be a worthless treatment.[1]

The Federal Food, Drug, and Cosmetic Act authorizes dissemination of information regarding drugs in situations involving imminent danger to health or gross deception of the consumer.[2]

The Hoxsey treatment for internal cancer involves such drugs. Its sale represents a gross deception to the consumer. It is imminently dangerous to rely upon it in neglect of competent and rational treatment.

The Hoxsey treatment costs the patient $400 plus $60 in additional fees; expenditures which will yield nothing of any value in the care of cancer. It begins with a superficial and inadequate examination of the patient at the Hoxsey Cancer Clinic, Dallas, Texas, or Portage, Pennsylvania. The patient at Dallas is then supplied with one of the following "cancer" medicines: Black pills, red pills, a brownish-black liquid, or a light red liquid. The black pills and the brownish-black liquid contain: Potassium iodide, licorice, red clover blossoms, burdock root, Stillingia root, berberis root, poke root, cascara sagrada, prickly ash bark, and buckthorn powder. The red pills contain potassium iodide, red clover, Stillingia root, poke root, buckthorn, and pepsin. At Portage the patient is given the same "cancer" medication although the colors of the pills are different. The light red liquid medicine is potassium iodide in elixir of lactated pepsin. There is evidence that potassium iodide accelerates

[1]The court decisions can be found in Volume 198, Federal Reporter, Second Series, page 273, and Volume 207, Federal Reporter, Second Series, page 567.

[2]21 U.S.C. 375 (b) This authority has been delegated to the Commissioner of Food and Drugs by the Secretary of Health, Education, and Welfare, 20 Federal Register 1998.

*concluded on page 411*

# CAN ANYONE HELP WITH AN EXPLANATION?

## Report of a Case

FRANCIS J. KING, M.D., *Chief of Surgery,* AND PAUL COHEN, M.D., *Anesthetist,*
OF WOONSOCKET HOSPITAL

A 22-YEAR-OLD married white female was admitted to the hospital 6/23/55 complaining of constant dull ache in the R.L.Q. She had had a normal delivery and recovery 4/22/55.

Three days previously, after supper, she began to have upper abdominal cramps, with vomiting, radiating to mid-back. Cramps all the next day. Ate a bowl of soup for supper and vomited. Pain was in the upper abdomen below the ensiform. She called her physician at 4:00 A.M. today and was given 100 mg. of Demerol. At that time, temperature, pulse and respirations were normal. She was slightly tender below the ensiform. About midforenoon the pain localized in the R.L.Q.

She had her first period two weeks ago. No history of trauma. No diarrhea. Normal stool yesterday. No G.U. symptoms. She had several attacks of abdominal distress in the past six weeks but none as severe as this one. There was a history of four attacks of severe epigastric pain referred to mid-back lasting from two hours to all night, during her pregnancy, and three attacks since. She was never jaundiced.

She was a well-developed, young female 5'-6", 146 pounds. Temperature 98.6. Pulse 72. Respirations 18. Blood pressure 120/74. Physical examination negative except for abdomen. Marked tenderness over the right side of the abdomen without any rigidity. No palpable mass. The uterus was small in anterior position. Adnexae normal. No cervical tenderness. A rectal examination revealed the same pelvic findings. The maximum point of tenderness was over McBurney's point. Moderate distention. Very little peristalsis.

RBC 4.41. WBC 11.5. Hemoglobin 87. Polys. 93.

Urine + for bile with a moderate number of WBC per HPF.

At operation the mesentery of the right colon from the ileo-cecal valve to the hepatic flexure was black and edematous. The color of the gut was purplish pink. A tense, distended gallbladder full of stones was palpated.

A right colectomy with an end-to-end anastamosis was done. Recovery was uneventful. A cholecystectomy was done four weeks later.

Pathological examination showed edema of the mesentery and serosa and slight early infiltration of the muscularis and serosa by polymorphonuclear leucocytes. The veins and arteries showed no evidence of thrombosis.

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### HOXSEY CANCER TREATMENT

*concluded from page* 410

the growth of some cancers.

The Food and Drug Administration has conducted a thorough and long-continuing investigation of Hoxsey's treatment. His claimed cures have been extensively studied and the Food and Drug Administration has not found a single verified cure of internal cancer effected by the Hoxsey treatment. In addition, the National Cancer Institute of the United States Public Health Service has reviewed case histories submitted by Hoxsey and advised him that the cases provided no scientific evidence that the Hoxsey treatment has any value in the treatment of internal cancer.

On October 26, 1953, Harry M. Hoxsey, the Clinic, and all persons in active concert with him were enjoined by the United States District Court at Dallas, Texas, from shipping their worthless cancer medicines in interstate commerce with labeling representing, suggesting, or implying that the products are effective in the treatment of any type of internal cancer. While the Government intends to prosecute violations of the injunction, this warning is necessary for the immediate protection of cancer victims who may be planning to take the Hoxsey treatment.

Those afflicted with cancer are warned not to be misled by the false promise that the Hoxsey cancer treatment will cure or alleviate their condition. Cancer can be cured only through surgery or radiation. Death from cancer is inevitable when cancer patients fail to obtain proper medical treatment because of the lure of a painless cure "without the use of surgery, x-ray, or radium" as claimed by Hoxsey.

GEO. P. LARRICK
*Commissioner of Food and Drugs*

***WEDNESDAY, OCTOBER 24***

***Interim Meeting* of the R. I. Medical Society**

***Scientific Session* — Medical Library**

***Dinner Meeting* — Sheraton-Biltmore Hotel**

***Check the date NOW!***